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Founded 1896

Chicago, December 13, 1924 (*Issued Every Other Week*) Volume XXVII, No. 25



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*Next Issue Will Be Our Annual Review and Directory Number — December 27*

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# An Extraordinary Crushed Stone Operation

## National Stone Company, Having 100 Feet of Overburden on Its Limestone Deposit, Turns from Quarrying to Mining

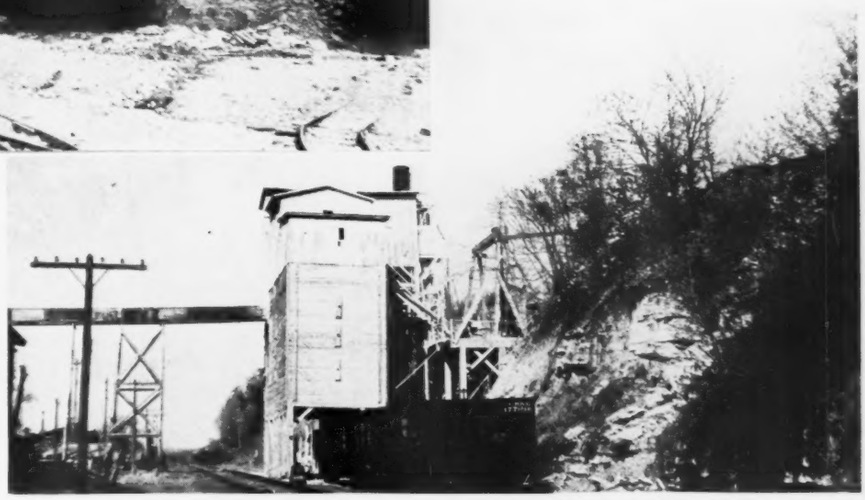
By Charles A. Breskin

ONE of the most extraordinary crushed stone producing operations in the country is that of the National Stone Co. at Louisville, Nebraska, near Omaha. Think of removing over 100 ft. of overburden to get at a 24-ft. ledge of limestone! And yet this was done and done profitably for a number of years, until rising costs and other conditions made it necessary to turn to mining in place of the usual quarry methods.

The National Stone Co.'s quarry is along the bluffs of the Platte River. The ledge of limestone is 24 ft. thick in the thickest places and in others it dwindles down to nothing. Above the limestone ledge is clay and over that fine dirt (probably loess). The total overburden runs from 80 to 110 ft. in depth. Before mining methods were adopted the dirt above was washed away by a hydraulic monitor and the lower clay, which was too tough for hydraulicking, was removed by steam shovel and cars. The limestone was then shot down, hand loaded into cars and hauled to the crushing plant by horses, which have since been displaced by gasoline locomotives.

Some of the accompanying photographs show the operation as it used to be before the stone was mined. Water for hydraulicking purposes was taken from the Platte river by a 5-in. 3-stage centrifugal pump with a 600 g.p.m. capacity and delivered water to the nozzle of the monitor at 100-lb. pressure. All the dirt that was removed was sluiced into the Platte River and to remove the clay a 70-C Bucyrus steam shovel was employed. How many tons of this overburden was removed is hard to estimate but there is still a good-sized mountain of it at the quarry.

The limestone itself lies in a well-defined stratum and ranges in color from white



***Entrance to the limestone mine of the National Crushed Stone Co. The ledge above the pillars forms a solid roof for the workings. Below, the crushing plant***

*The quarry before the rock was mined, showing the limestone ledge, the layer of clay above and the heavy overburden of fine dirt above the clay*

to gray. It has a crushing strength of 14,000 to 18,000 lb. to the square inch. There are other ledges in the deposit that cannot be mined or quarried as they contain a yellow stone that is so soft that it has no commercial use.

After 20 years of operation by the old method, during which costs mounted steadily, the company decided to mine the deposit. The factors which governed its decision in addition to rising costs were difficulty of stripping, lack of uniformity in the product, impurities in the product and impediments to continuous operation from extreme weather conditions.

In changing from quarrying to mining the room and pillar methods were adopted. Several drifts were driven into the hillside and rooms opened up 30 by 24 ft. with 18-ft. pillars between. In some places in the deposit tunneling is not feasible, due to the absence of a strong roof. However, where there is a good roof, a clean stone is obtained and the operation continues without any delay.

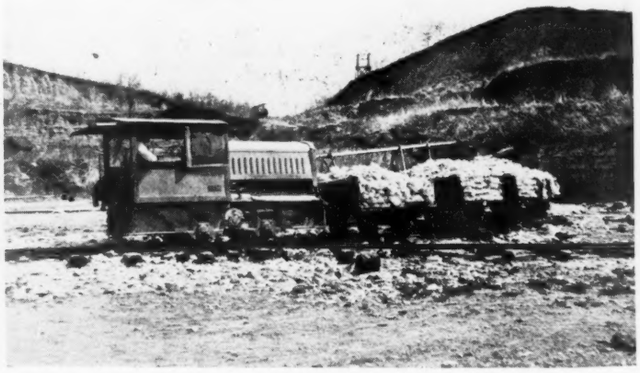
In advancing the face a "pioneer bench" about 6 ft. high is driven at the roof and the remaining 18 ft. or so is broken by blasts in vertical drill holes. Pneumatic drills of the jackhammer type and 40-60% nitroglycerin dynamite are used to bring the stone down.

Loading is done by hand and horses are used to gather the cars. Transportation to the crushing plant is done by Whitcomb gasoline locomotives. At the time of the writer's visit comparative costs between quarrying and mining were not obtainable, although it is to be expected that in an operation of this type, the cost will be considerably lowered by the change. About 500 tons of stone are mined daily.

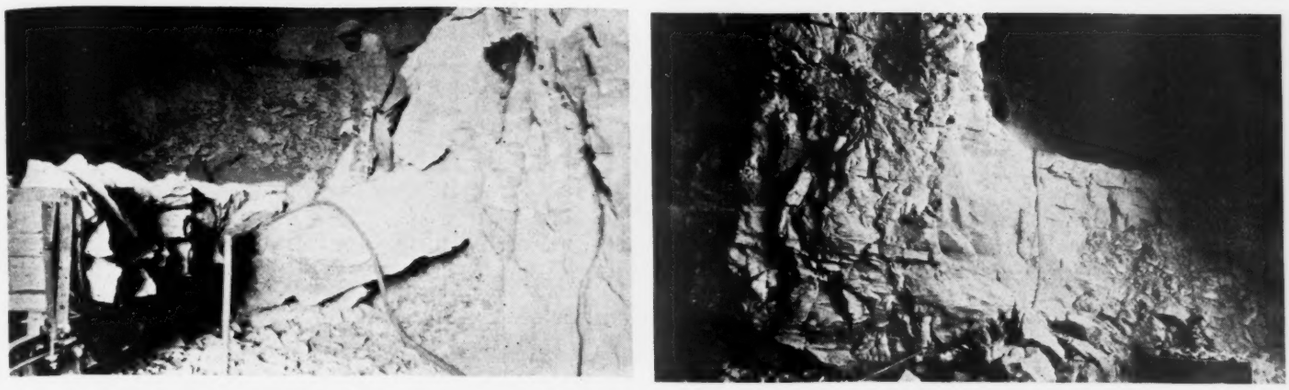
When the company started some 20 years ago an excavation was made in the hillside and in this was located a No. 5 gyratory crusher, two 60-hp. boilers, a steam engine and a 12x7-in. steam pump. Since then this equipment has been supplanted by a No. 7½ gyratory, a 36-in. Symons disk crusher and a modern screening plant with electrified drives throughout.

The stone is hauled to the crusher in trains of 3½-ton side-dump cars, designed by the company. Two cars at a time are "spotted" on a home-made cradle rocker and secured to it by safety hooks. A latch is released and the stone is dumped into the crusher chute; the cradle then rocks back

*Removing the fine dirt with a hydraulic monitor. The clay below had to be dug with a steam shovel*



*Left—A view of the plant and quarry on the bank of the Platte river. Right—Locomotive and cars bringing material from the mine*



*Working underground. Left—Car loading. Right—A pillar and the "pioneer" bench driven just under the roof*

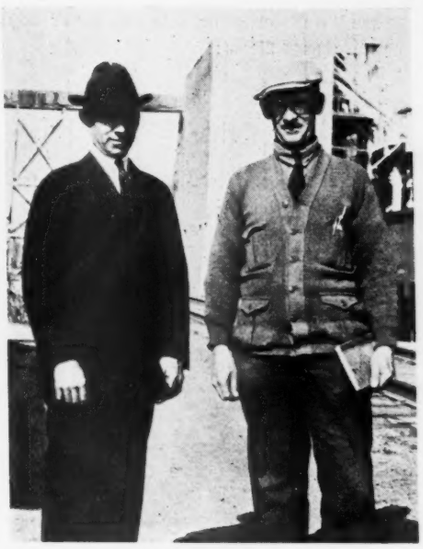
into place, the empty cars are pulled off, and the performance repeated as often as necessary. The complete dumping operation, with the exception of putting safety hooks into position, is practically automatic.

The stone is first reduced in a No. 7½ Chalmers & Williams gyratory crusher. It is chuted direct to a 40-in. by 12-ft. scalping screen with 2-in. perforations. The oversize from the screen goes to a bucket elevator delivering to a 36-in. Symons disk crusher, while the undersize goes to the main elevator discharging to an O'Laughlin screen that has been rebuilt to twice its original size. The product of the disk crusher also discharges to the main elevator. The O'Laughlin screen separates the stone into five different sizes, discharging directly into bins below with a combined capacity of 500 tons. The oversize from the screen can be spouted back into the No. 7½ gyratory crusher or the Symons disk crusher as desired.

Railway cars are loaded direct from the bins. A standard track scale is on the loading track directly under bins, facilitating quick shipments of exact quantity ordered. The entire crushing and screening plant is driven through line shafting by a 125-hp. motor. A 15x9x10-in. Chicago Pneumatic air compressor driven by a 75-hp. motor furnishes all the air for drilling.

The general manager of the National Stone Co. is Thomas Sullivan, who is a familiar figure at all the National Crushed Stone Association conventions. He is as ready with his Irish wit as he is with his knowledge of quarry and crushing plant operation. He is largely responsible for the success of the National Stone Co.'s plant, having guided its destinies since it was started. Mr. Sullivan goes into nothing without studying everything very intensively. His quarry and plant are clean —scrupulously so. The quarry floor is as smooth and clean as a house floor. Mr. Sullivan has his offices in Omaha and he is equally as good a salesman as he is a quarryman.

[A full explanation of the method of mining used in the operation described above will be found in J. R. Thoenen's article published in the June 28 issue of Rock Products.—Ed.]



*Thomas Sullivan, general manager, and Fred Brimer, superintendent*

## Bureau of Mines Researches on Anhydrite

SERIAL No. 2654 of the Bureau of Mines tells of the recent researches of the bureau to find commercial uses for anhydrite. The results of the tests so far are negative, although some important facts bearing upon the stability relations of gypsum and anhydrite have been established.

The earlier researches on anhydrite are reviewed and commented upon in the report. It is well known that anhydrite combines with water to form gypsum at temperatures below 60 deg. C. and the tests were made to see if increasing temperatures and pressures would not accelerate the action.

These results were negative, the only fact established being that anhydrite cannot be rehydrated under conditions of high temperature and pressure. This, it is pointed out, is not surprising, considering that anhydrite is the stable form above 60 deg. C. The tests bear out those of van't Hoff, who measured the vapor pressure of the water of crystallization of gypsum in equilibrium with the half-hydrate at different temperatures by a number of ingenious methods.

Copies of the report may be obtained from the Bureau of Mines.

## French Bauxite Deposits Face Early Exhaustion

A UNITED States Commerce Report by Commercial Attache Chester Lloyd Jones, Paris, tells of a shortage of manufactured aluminum in France, but a big increase in the production and export of aluminum ore, or bauxite. This has an important bearing on the high alumina cement industry, since, at the present time, practically all of it on the market is made from French bauxite. The report states:

Meanwhile, although local manufacturers find difficulty in securing raw aluminum, the export of bauxite from France is rapidly rising and is beginning to create anxiety among French manufacturers as to the possible exhaustion of the national bauxite resources. Competent authorities now estimate the reserves of high-class bauxite in France as not greater than 60,000,000 tons. The continuance of the exports of bauxite at rates recently obtaining, with domestic consumption at the high level of 1924, would seem to threaten the national resources of the ores from which raw aluminum is made.

## Rates on Alabama Asphalt

THE public service commission of Alabama has granted the petition of the Florence chamber of commerce for a rehearing of the case against all railroads operating in Alabama which involves rates on asphaltic rock or bituminous asphalt rock when shipped from Margarum to other points. A reduction in rates was recently ordered by the commission, but the commercial organization is seeking a further reduction.—*New Orleans Journal of Commerce.*

# Mining and Quarrying Compared by an Engineer Familiar with Both Operations

## Part 7—Description of a Typical Gypsum Mining Operation

By J. R. Thoenen, Member A. I. M. E.

### *Plant (M)—Typical Gypsum Mine*

In this mine the bed of gypsum mined reaches a maximum thickness of 48 in. The mine is entered through a slope at 15 deg. up which cars are hauled by electric hoist. Directly on top of the gypsum bed lies a 6-in. stratum of limestone which will not stand after removing the ore and is taken down later. A portion of the limestone floor is also removed 18 in. deep to provide headroom for mule haulage. The removal of this upper and lower stone presents a cost analogous to open-pit stripping costs and are so shown in the percentage costs given.

The room and pillar method of mining is used with 24-ft. rooms and 16-ft. pillars.

The method used in breaking ground is that described in my article (June 28) as breast stoping. All drilling is done by contract and miners are not directed in the placing of holes by any system.

Holes are drilled by electric drills using twist steel, two in each vertical row, and to a depth of 8 ft. They carry an average burden of 3 ft. For blasting 20% ammonia dynamite is used. For hauling 2½-ton open-end steel cars are loaded by hand on contract and hauled to the foot of the slope by mules.

Approximately 1½ tons of gypsum are broken per pound of explosive.

Each foot of hole drilled produces ½ ton of ore. About 14 tons of ore is produced per man underground per day.

Based on 100% for total cost per ton costs are as follows:

| | |
|---|---|
| Stripping (upper and lower strata) | 19.8% |
| Explosives | 7.8% |
| Labor | 48.0% |
| Supplies | .9% |
| Fuel | 3.1% |
| Depreciation | 7.2% |
| General Expense | 13.2% |
| | 100.0% |

*Drilling in gypsum in a Pennsylvania mine*

A similar mine but operating on a gypsum bed from 6 to 14 ft. thick produces 3 tons for one pound of explosive, one ton per foot of hole drilled, and 11 tons per man underground.

Another mine operating on a vein varying from 30 to 52 in. produces one ton of rock per pound of explosive, ½ ton per foot of hole, and 5 tons per man underground.

### *Plant (N)—Mining a 6-ft. Stratum of Gypsum*

Operations at this plant differ from those of plant (M) in that the vein is 6 ft. thick and a regular system of placing drill holes is used.

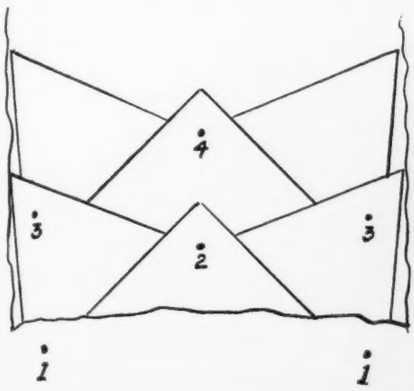
Rooms are carried 30 ft. wide and pillars 12 ft.

Two systems of drilling holes are used. One is a straight center or V-cut of eight 6 ft. holes followed on each side by a row of four 6-ft. holes as relievers, and these in turn by four 6-ft. rib holes along each pillar or 24 holes to each round. The second method is similar to that of plant (D). With the drill set up at the side of the room three holes are drilled along the pillar and three at an angle toward the center as in a V-cut. This is repeated from the opposite side of the room. Then this center cut is shot and cleaned out. The drill is now set up in the apex of the cen-

*Streams of water which entered a gypsum mine uninvited*

ter cut and three holes drilled to meet each set of three drilled along the pillar from the former set up. Thus 18 holes complete the round. They average 6 ft. per hole.

Each method produces approximately ½-ton per foot of hole drilled, but theoretically the former method breaks 2 tons




***Plan of setting up drills for working in Plant N. Six holes are drilled from each set-up***

per pound of explosive and the latter 2½ tons.

This mine produces 6 tons of rock per man underground per day.

### *Plant (O)—Mining in 18-ft. Stratum of Gypsum*

This mine is entered by a three-compartment shaft 75 ft. deep. The shaft is lined with concrete the whole depth.

The gypsum bed or vein here has a total thickness of 18 ft. but has a 3-ft. bed of flint and shale in the center.

The method of mining originally employed was to take out the lower vein of gypsum first, then to take down the shale and flint, and by a third step remove the upper bed of gypsum. This resulted in too much shale entering the gypsum recovered and the present system was adopted.

The upper stratum of gypsum is now mined first, by room and pillar methods with rooms 25 ft. wide and pillars 18 ft.; 2½ ft. of gypsum is left in the back to support the shale above. These rooms are then 6½ ft. high. The method of drilling is that described under plant D (October 4).

When these rooms have been advanced some distance the underlying shale and flint is drilled with short vertical holes in the rooms behind the loaders where it remains permanently.

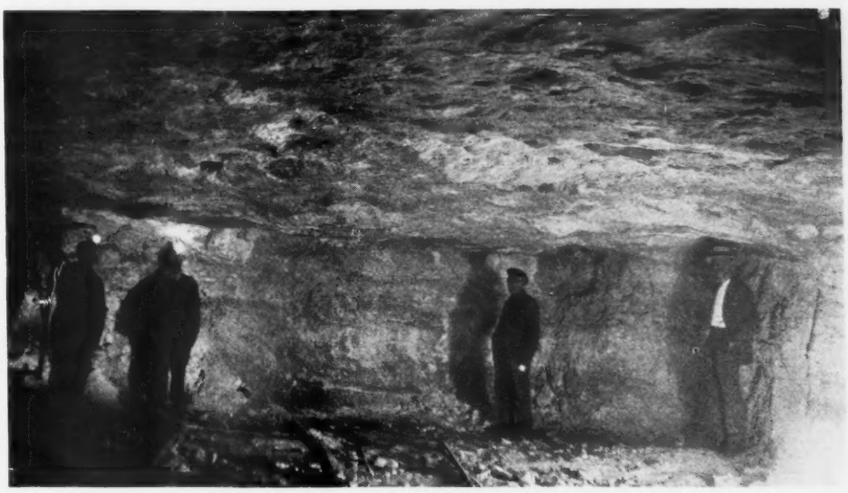
The lower bed of gypsum is then mined by underhand or bench stoping.

In the breast stopes fifteen 8-ft. holes advance the room 7 ft. and a foot of hole produces a little over ½-ton of ore.

In the bench stopes holes are drilled 8 ft. deep, spaced 3 ft. and carry 7 ft. of burden, each foot of hole producing 1½ tons of ore.

In the breast stopes 20% gelatin dynamite is used and approximately one stick is charged per foot of hole, producing 1½ tons of rock per pound of explosive.

In the bench stopes each hole is charged with five sticks of 30% gelatin resulting in approximately four tons of rock per pound of explosive.



***Room heading in the upper bench of a Michigan gypsum mine***

***Lower bench of a Michigan gypsum mine and shale bedding above***

and blasted. This material is removed only as fast as the bench stope on the lower bed of gypsum is advanced. In other words this bed of shale is removed as overburden. When the bench stope on the lower bed of gypsum has advanced to shale not yet stripped a portable trestle is set up and the shale removed and piled

The shale is drilled as a bench stope with 3-ft. holes, spaced 3 ft. and carrying 7 ft. of burden. These holes are loaded with two sticks of 30% gelatin each. Removal of shale costs 6 cents per ton mined.

In this mine approximately six tons of rock are produced per man underground.

*(To be continued)*

## A Revolutionary Locomotive

THE Delaware and Hudson Co. has developed a steam locomotive that may change the status of railroad transportation from its fuel economies. The coal required for the same power is more than a third less than is used in locomotives of the usual type. This economy has been attained by the simple methods of using an additional low-pressure cylinder and a higher boiler pressure, 350 instead of 200 lb. This locomotive represents about 20 years of research on the part of the Delaware and Hudson Co. L. F. Loree, president of the company in discussing the new machine, pointed out that it takes 1150 heat units to raise water to steam at no pressure, while an additional 49 heat units will raise it to 200 lb. pressure. An addition of only 7½ heat units will raise it to 350 lb. pressure, as in the new locomotive, thus securing 75% more power at a small additional fuel cost.

# Dredge with Its Own Electric Power Plant

## The Allegheny, the Largest Dredge in the Pittsburgh District, Which Has a Theoretical Capacity of 1000 Tons Per Hour

THE *Allegheny*, belonging to J. K. Davison & Bro. of Pittsburgh, is a remarkable dredge in many ways. In the first place it is probably the largest in the Pittsburgh district. Then it is all steel, not only the hull but the entire superstructure, and all the supports for the machinery. Wood is employed only in the finishing of the quarters of the crew and even there it is used sparingly. Finally, while it has a remarkable digging capacity, it does its work with a surprisingly small consumption of fuel and lubricants, owing to its electric power plant and drives.

This is the third year that the *Allegheny* has been in service and nothing has developed that could give rise to trouble in operating, and the time lost in repairs and making changes of wearing parts is even less than it was expected to be when the dredge was built.

The dredge is of the center ladder type and the buckets each hold 21 cu. ft. They discharge at the rate of 16 per minute, which would give the dredge a theoretical capacity of over 1000 tons per hour if it was worked steadily. But such a capacity could not be kept up owing to the difficulty of changing barges quickly enough. And there is always of necessity a considerable amount of material put back into the river, either as oversize or because a barge is not ready on one side as soon as the barge on the other, or because more sand than gravel is wanted or for some other good reason. But making all these allowances the output must be very large, for the writer saw a 125-ton gravel barge filled in 15 minutes, and there was a heavy flow of sand at the same time to a barge on the other side.

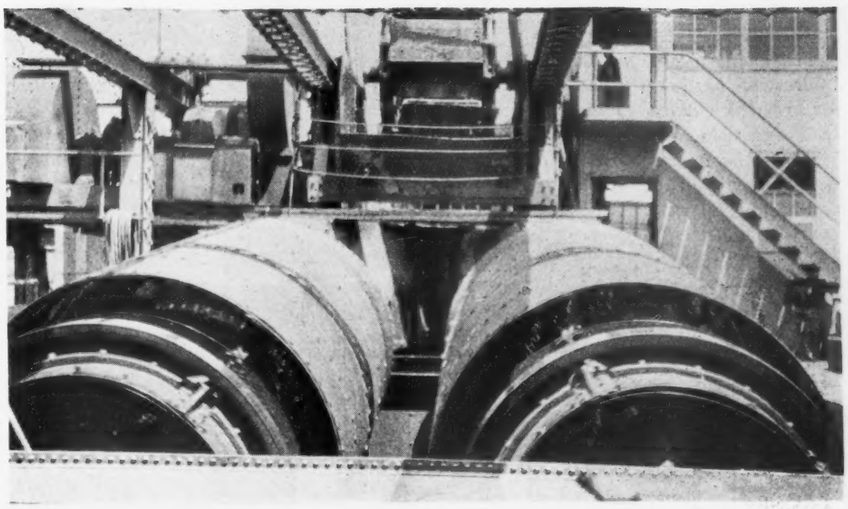
The sand and gravel fall from the buckets on a grizzly and are washed through to the screens by powerful streams of water from two 10-in. De Laval centrifugal pumps. Ordinarily this flow amounts to 10,000 g.p.m. Capt. Chas. A. Smith, in command, who was mainly responsible for the design of the Allegheny and who superintended the construction, said that he made up his mind that this would be one dredge that had sufficient water for washing and screening, all the other dredges that he had commanded, or even seen, being deficient in this respect. The effect of plenty of water is seen in the screening efficiency and the cleanliness of both sand and gravel.

The screens are of the tire and trunnion type, 15 ft. long with two jackets. The outer (sand) jacket is 9 ft. in diameter. This jacket is of ¼-in. square mesh wire cloth. The inner jacket is of punched steel plate with square holes 2½x2½-in. The location of the screens is on the upper deck where one can walk all around them and see what is going on, and where jackets can be changed comfortably when this is necessary. A 75-hp. motor drives the screens but only 35 hp. is used.


***The Allegheny. Note the all-steel construction, including even the supports of the machinery***

Both gravel and sand go to boxes or sumps along with a heavy stream of water. The overflow from these boxes combined with the agitation produced by the buckets of the sand and gravel bucket lines makes them efficient washers, and sticks, trash and mud are separated and carried away in the overflow.

The bucket lines for handling the sand and gravel (one for each) have buckets of 9 cu. ft. capacity. The gravel buckets discharge directly into barges or into a cylindrical screen. Most of the time this screen is used as a re-screen to insure that the gravel is free from any fines that may not have passed through the main screen. But by changing jackets, which may be done in a short time, this screen may be used to make two sizes of gravel. A screen on the sand side enables two sizes of sand to be made.



*The screens are easily accessible from all sides*

The details of construction are interesting. The digging ladder, which can dig 60 ft. below water level, is supported by a wire cable reeved through blocks in the ordinary way. The cable runs to a motor-driven hoist which sits on a gantry frame above the ladder and which can be moved to insure a straight pull.

*Power plant. Turbo-generator in the background*

The main bucket line is made up of the 21-ft. buckets and a heavy manganese steel chain which has stood three years of wear without showing it to any extent. The links pass over the usual "square" and "hex" pulleys at the head and foot of the ladder and these pulleys are supported on heavy nickel steel shafts. All the heavy shafting on the dredge is of nickel steel. The 250-hp. motor which drives the bucket line has a herringbone gear reduction and the speed is further reduced to the bucket line speed by very large and heavy spur gearing. All the gearing and the motors are enclosed in metal housings.

The bucket lines for sand and gravel require only 50 hp. motors to drive them. The reduction in this case is through a worm gear instead of a herringbone. These lines have manganese chains and buckets of the same type as those on the main digging ladder.

The buckets are not of the rounded type seen on so many dredges but resemble the buckets of an ordinary mill elevator. The heads of the buckets and the cutting lip are of manganese steel, and the body of the bucket, on which there is very little wear, is of ordinary 3/8-in. steel plate.

All bearings on motors, reductions, etc., are of bronze and have self-oilers with extra large oil reservoirs. Some of them have been fitted with grease cups as a measure of protection in case something should go wrong with the self-oilers, but in three years of service the grease cups have never been called into use. Once a season the bearings are washed out and filled

*Power plant. Condenser and air pump (at left)*

with fresh oil and that is all the attention they require.

The power plant is perhaps the most interesting part of the boat as it is this feature which differentiates this dredge so widely from the other dredges in the Pittsburgh district. Steam is made in two Heine water-tube boilers of the marine type, each of 302 hp. They will stand a considerable overload and the dredge can be run with one boiler while the other is being washed out. The steam pressure is 160 lb. and the boilers blow off at 165 lb.

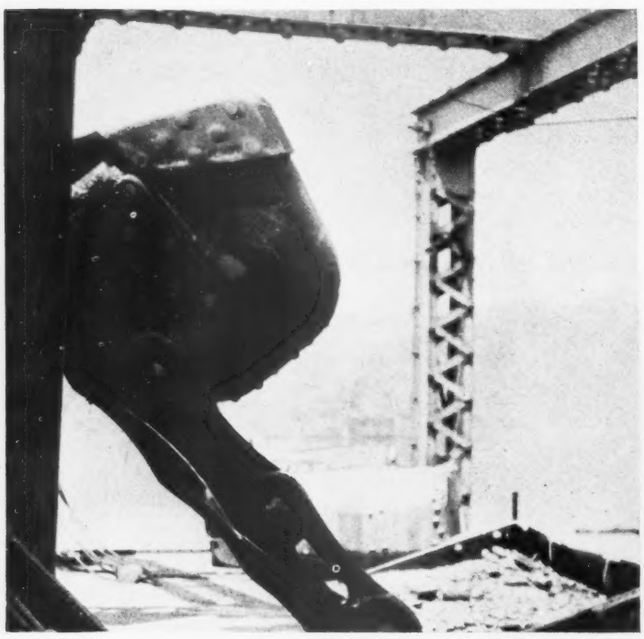
The steam turbine which drives the generator was made by the Kerr Turbine Co. of Wellsville, N. Y., and is rated at 500 kw. It is directly connected to a generator made by the General Electric Co., which is of the direct-current type. Direct-current motors are preferred to alternating-current motors for the work of dredging owing to the heavy torque they develop at starting and under the strain of digging. All the motors are of Westinghouse make and there are 21 of them, large and small, on the boat. Even the pump that supplies fresh water to the kitchen is motor driven, and electric fans in the living quarters keep them cool on the hottest nights.

The exhaust from the turbine goes to a Worthington marine type surface condenser with Worthington circulating pump and air pump.

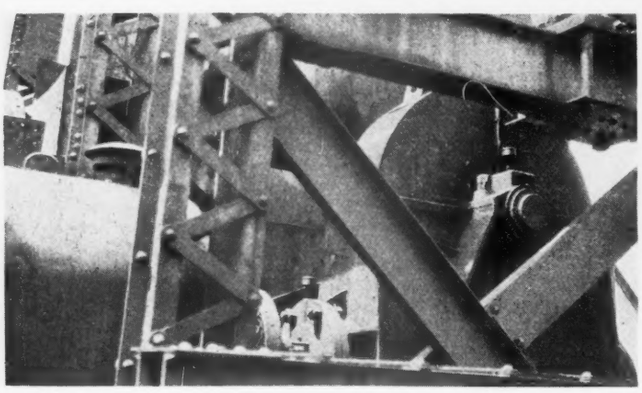
The oil consumption in this power plant is almost unbelievably low. A quart a day is used by the circulating pump and air pump and 2½ gal. per month by the turbine. Of course the turbine has a circulating oil system in which the oil is not only returned but filtered before it goes to the bearings. The turbine and the generator run at 3600 r.p.m.

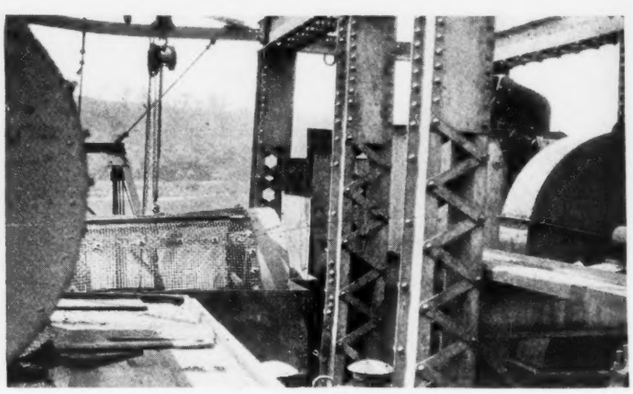
Boilers are washed out once a week and to prepare for a washout it is only necessary to let the fire go out under the boiler. An automatic valve cuts out the boiler as soon as the pressure drops 10 lb. To resume operations after washing out, the fireman has only to build a fire and get up steam, and as soon as the working pressure is reached the same valve automatically cuts in the boiler.

Coal consumption averages 125 bu. per 12-hour shift, which at 28 bu. to the ton figures about 4½ tons. The other dredges of the company's fleet will use almost as much coal for a much less production of sand and gravel, the difference being due to the design of the power plant. And there is not only a great saving of fuel with this type of power plant but a still greater saving in having no lost time for repairs. In the three years that the boilers have been in service just one leaky tube has had to be repaired. And the lost time from electrical troubles has been less than two hours in the three years. A competent electrician who is also chief engineer is employed, but his duties have been light as far as repair work goes. His efficiency has shown itself in foreseeing and preventing trouble.

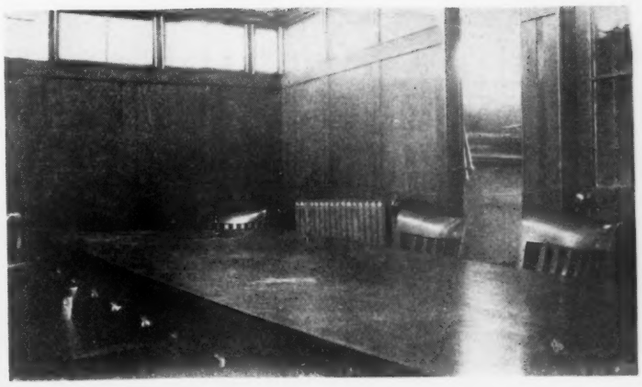


*Left—One of the 21-cu. ft. buckets. Right—Towboat "Elizabeth Smith"*

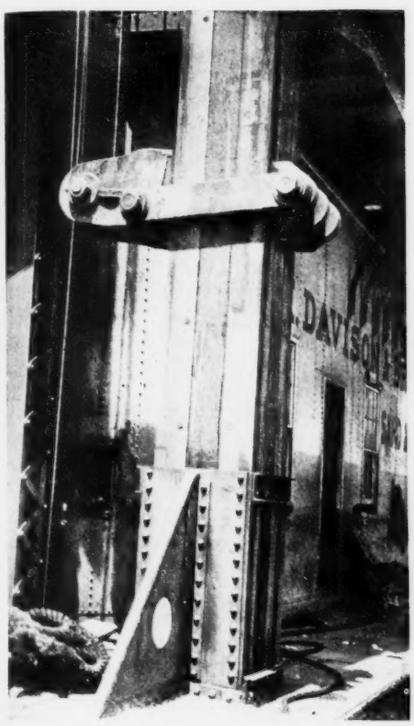




*Left—Enclosed gearing. Right—Fine gravel screen lifted for changing screen fabric*



*Left—Filled hopper barges. Right—Social room for the crew*

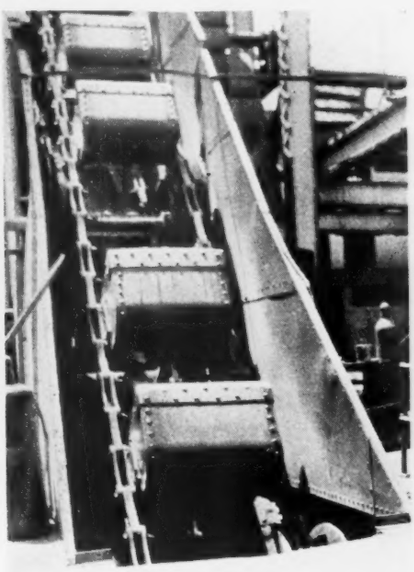


*Spud and clamp*

All the controls of the boat are brought to a house directly above the main digging ladder so that everything is in the hands of the man in charge there. He can move the boat and raise and lower the spuds without leaving his place. The spuds are each 24 in. square, built up of timber with 8-in. angle irons at the corners riveted through with 7/8-in. rods. Each spud has its own 15-hp. motor for raising it. The spud is handled by a heavy clamp attached to a wire cable and block and falls.

A repair shop is maintained and the equipment includes a 150-cu. ft. Westinghouse compressor for pneumatic tools.

The living quarters for the crew are clean and light and handsome enough for a passenger boat. The finishing is of plywood which will not warp or swell with dampness. There is a large social room where the men read or play games when off shift and the sleeping quarters open out of this. The dining room is ample and nicely furnished, and the writer can testify to the excellent quality of the meals that are served there. Everything is done to make the crew feel that this is their home. Capt. Smith says that he found out long ago that one good self-respecting man who appreciated good living quarters and comfortable surroundings was worth a dozen of the scrub kind who might put up with anything but who would be sure



*Sand ladder*

to fail one in a pinch. The crew bears out his judgment in this respect for they look "hand picked."

The *Allegheny* was built by her owners, J. K. Davison & Bro., who have been in the sand and gravel business all of their working years. The concern was originally a partnership of the uncles of the present owners, and when it was incorporated as a company the old name was retained. George Mc. Davison is president, Harry S. Davison, secretary-treasurer, and Butler Davison, vice-president. Wm. Smith is sales manager.

Three dredges are operated by the company, and 18 steel barges and one hundred 125-ton wooden barges are kept in service; at present 12 additional steel barges are under construction. The steel barges hold 700 tons when fully loaded, but they are not fully loaded except at high water stages on account of the draft, which is then 11 ft. All the barges are of the hopper type which this company prefers to the flush deck type. The tow boat, which does most of the towing of these barges, is the *Elizabeth Smith* (Capt. Cavitt) and she has the reputation of being one of the busiest boats on the three rivers. The dredging is exclusively in the Allegheny river some 15 miles above Pittsburgh.

Landing places are maintained opposite Aspinwall just out of the city and at the foot of 30th street in Pittsburgh. At this landing there is a fine set of steel bins

*Capt. C. A. Smith*

which are loaded from the barges by a stiffleg derrick and a 2½-yd. bucket. The hoist is a Lidgerwood. A similar, but larger, derrick and hoist unloads barges at the other yard with a 3-yd. bucket.

The offices of the company are at 42nd and Davison streets in Pittsburgh.

# On the Constitution and Burning of Artificial Portland Cements*

## Part VII. A Study of Hydraulic Cementing Materials Other Than Artificial Cements†

By J. E. Duchez

(Authorized Translation from the French Revue des Materiaux de Construction by C. S. Darling)

WE have agreed that a hydraulic cementing material is characterized by the molecular composition

$$x\mathrm{SiO_2}+y\mathrm{Al_2O_3}+n\mathrm{CaO}$$

and we have shown in the first part of our study that the combinations of these elements may result in the formation of silicates and aluminates of lime of different basicity, according to the temperature and time of burning.

The silicates may be comprised between $SiO_2 2CaO$ and $SiO_2 3CaO$ and the aluminates between $Al_2O_3 CaO$ and $Al_2O_3 3CaO$, or even between $Al_2O_3$ and $Al_2O_3 CaO$. The quantity of lime remaining free is variable and has zero for its low limit.

### *Pure Limes*

Pure lime is that in which the molecular composition shows $x$ and $y$ to be equal or very close to zero (industrially pure lime). It is indeed quite rare to find a natural limestone corresponding exactly to the formula $CaCO_3$ and giving a chemically pure CaO directly by burning.

However, limestones exist in which the silica and alumina content are sufficiently small so that the influence of these two materials may be disregarded.

On burning, these limestones therefore give:

$$\mathrm{CaO}+\text{burning}=\mathrm{CaO}+\mathrm{CO_2}+\text{Calories}$$

The product taken from the kiln CaO (oxide of calcium) by hydration gives hydroxide of calcium, which crystallizes in the hexagonal system:

$$\mathrm{CaO}+\mathrm{H_2O}=\mathrm{CaO(H_2O)}=\mathrm{Ca(OH)_2}$$

The calcium hydroxide sets slowly and has but little strength. It is not hydraulic. Eventually it takes on a carbonate form by absorption of carbonic acid from the air and acquires a certain hardness. The laboratory of *Tonindustrie Zeitung* examined in 1904 a fragment of mortar several centuries old which showed a marked strength. From this sample there was determined the total lime, the lime combined with carbonic acid, and the free lime by taking the difference from that combined with silica. The free lime was titrated with the aid of hydrochloric acid, with phenolthalein as indicator, which does not take account of the lime in the silicates. The following composition was therefore obtained:

| | Per cent |
|---|---|
| Sand, stone, fragments of brick | 58.59 |
| Soluble silica | 0.90 |
| Alumina and oxide of iron | 0.52 |
| Lime | 21.34 |
| Magnesia | 0.51 |
| Carbonic Acid | 15.38 |
| Water | 2.73 |
| Total | 99.98 |
| Lime combined with carbonic acid | 19.57 |
| Lime combined with silica | 0.76 |
| Free lime (by difference) | 1.01 |

The very small quantity of free lime shows that the return to the carbonate is almost complete in time.

Put in contact with soluble silica, $SiO_2$, the calcium hydroxide combines with the latter to give hydraulic products of variable strengths according to the formula:

$$\mathrm{SiO_2}+\mathrm{Ca(OH)_2}+1.5\mathrm{H_2O}=\mathrm{SiO_2CaO2.5H_2O}$$

which represents the reaction of setting of puzzolanic mixtures with a silica base. The setting is slow and the combination can take place only if the silica is present in the form of soluble $SiO_2$, for, even with time, lime does not react with $SiO_2$ in the form of sand, as indicated in the analysis of the preceding mortar in which the very small quantity of soluble silica proves that we cannot admit the decomposition of sand by lime without heat, even after several centuries.

When put in the presence of silicates of lime other than those where the basicity is below two molecules of lime, the reaction of $Ca(OH)_2$ with a silica of the silicates does not take place.

$$\mathrm{SiO_2 2CaO}+\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{SiO_2CaO2.5H_2O}+2\mathrm{Ca(OH)_2}+\mathrm{aq}$$

$$\mathrm{SiO_2 3CaO}+\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{SiO_2CaO2.5H_2O}+3\mathrm{Ca(OH)_2}+\mathrm{aq}$$

This indicates that the hydrated silicate combines with only one molecule of CaO and liberates the balance. There results necessarily an increase in the number of molecules of $Ca(OH)_2$ of the final product and consequently an increase in the proportion of hexagonal crystallization for an equal number of crystallizations in needle form. There will therefore be no advantage in adding a silicious cement to a pure lime. This would only retard the setting of the cement and would decrease its strength.

On the other hand, the alumina hydrate $Al_2O_3 3H_2O$ is capable of reacting energetically with the hydrate of lime $Ca(OH)_2$ to form hydrated tricalcic aluminates which are hydraulic.

$$\mathrm{Al_2O_3 3H_2O}+3\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{Al_2O_3 3CaO 12H_2O}+\mathrm{aq}$$

Now we have shown in the study of the calcium aluminates that the aluminates less basic than $Al_2O_3 3CaO$ all liberate the hydrate of alumina in the presence of an excess of water.

If we add to $Ca(OH)_2$ an aluminate less basic than $Al_2O_3 3CaO$ there will be at first in the presence of water a formation of hydrated tricalcium aluminate, $Al_2O_3 3CaO\ 12H_2O$, for the entire quantity of lime contained, and the liberation of hydrated alumina, $Al_2O_3 3H_2O$, for the amount of the remaining alumina. This hydrated alumina will react later with the hydrate of lime according to the preceding equation.

Therefore, if we add mono-calcium aluminate to a pure lime, the hydration reaction will be:

$$\mathrm{Al_2O_3 CaO}+2\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{Al_2O_3 3CaO 12H_2O}+\mathrm{aq}$$

If we add bicalcic aluminate it will become:

$$\mathrm{Al_2O_3 2CaO}+\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{Al_2O_3 3CaO 12H_2O}+\mathrm{aq}$$

Finally, if we add tricalcium aluminate, it will be:

$$\mathrm{Al_2O_3 3CaO}+\mathrm{Ca(OH)_2}+\mathrm{aq}=\mathrm{Al_2O_3 3CaO 12H_2O}+\mathrm{Ca(OH)_2}+\mathrm{aq}$$

These formulas show that the quantity of lime with which there is reaction is as much greater as the aluminate is less basic, which is the same as saying that the addition of calcium aluminate to be made to a lime to obtain the maximum transformation of hexagonal crystallizations into lamellar crystallizations is as much less as the aluminate is less basic.

The results of these determinations are as follows:

1. *Artificial Hydraulic Lime*—Possibility of utilizing the waste products from the manufacture of pure lime and transforming them into building lime by the addition of



†See Revue des Matériaux de Construction, November, 1922, to March, 1923, and August, 1923.

aluminate of lime less basic than 3CaO, or soluble silica.

For the moment we will leave the question of the soluble silica aside to take it up in the chapter on the puzzolanes.

The aluminate to be added is found in commerce under the form of mono-calcium silico-aluminates, fused cements, quick-setting cements, aluminous blast furnace slags. The quantities to add vary according to the exact chemical composition; it is therefore preferable to determine them practically in each case. The mixing can be done before slaking or before grinding, except for quick-setting cements, where it is generally preferable to make the addition only before grinding.

There is a possibility of manufacturing a white artificial cement by mixing pure lime with a mono-calcium aluminate, fused cement in preference to quick-setting cement, the addition of which in considerable quantities gives a final product which is grayish white. The proportions are also to be determined by trial.

Some authors advise against the addition of fused cement to lime. This is for two reasons:

1. Poorly slaked lime.
2. Too rapid action of the fused cement, causing contraction.

It is evident that the pure limes are difficult to completely slake; and to manufacture white cement we advise, as a result of our experimental work, to completely slake the lime by complete immersion, dry it at 120 deg. C., and grind it before using.

As to the addition of fused cement, it is preferable for the manufacture of white artificial cement to permit the fused cement to set, and then to dry at 120 deg. C., and grind it.

In this manner the silicates have set, they become neutral, and the flaws of contraction are avoided. The alumina of a mono-calcium aluminate combines in part to form hydrated tricalcium aluminate, and there remains only the hydrated alumina to react with the lime. The set becomes appreciably slower and the products are perfectly stable.

### *Hydraulic Limes*

The molecular chemical composition is always:

$$x\mathrm{SiO_2}+y\mathrm{Al_2O_3}+n\mathrm{CaO}$$

Increasing the values of $x$ and $y$ and decreasing that of $n$, causes the formula of the burned product to vary between

$$x(\mathrm{SiO_2}2\mathrm{CaO})+y(\mathrm{Al_2O_3}3\mathrm{CaO})+[n-(2x+3y)]\mathrm{CaO}$$

and

$$x(\mathrm{SiO_2}3\mathrm{CaO})+y(\mathrm{Al_2O_3}3\mathrm{CaO})+[n-3(x+y)]\mathrm{CaO}$$

for it is rare that the temperature and time of burning are not sufficient so that there is always a formation of $\mathrm{Al_2O_3}3\mathrm{CaO}$ in a case of natural products and never that of aluminates less basic.

In these limits the quantity of lime remaining free after the hydration will be the same and will correspond to

$$[n-(x+3y)]\mathrm{Ca(OH)_2}$$

It would also be the same if the aluminates formed during the burning were less basic than 3CaO.

We have shown that the strength of hydraulic cementing in many materials varies on account of the differences in crystallization of the constituents.

If $n$ is large, the hexagonal crystallization necessarily is greater than the lamellar or needle crystallization of the silicates and the aluminates. As a result the greater the value of $n$ the less will be the strength.

If we add soluble silica to these limes we will increase the needle crystallization and we will have a greater adhesion and more cohesion in the final crystallization of a product. But if the silica is added in the form of silicate of lime, at the same time that we increase the needle crystallization we also increase the hexagonal crystallization as a result of the liberation of the hydrate of lime from these silicates. We would have an average crystallization which would have no or little effect.

We can represent schematically the crystallization of the lime:

$$x(\mathrm{SiO_2}3\mathrm{CaO})+y(\mathrm{Al_2O_3}\mathrm{CaO})+[n-3(x+y)]\mathrm{CaO}$$

in the following manner:

$$x(\mathrm{SiO_2}\mathrm{CaO}2.5\mathrm{H_2O})=x \text{ needles}$$
$$y(\mathrm{Al_2O_3}3\mathrm{CaO}12\mathrm{H_2O})=y \text{ lamellas}$$
$$[n-(x+3y)]\mathrm{Ca(OH)_2}=n-(x+3y) \text{ hexagons}$$

If we add to this lime $r(\mathrm{SiO_2}2\mathrm{CaO})$, the least basic silicate capable of setting, the scheme of crystallization will become:

$$(x+r)(\mathrm{SiO_2}\mathrm{CaO}2.5\mathrm{H_2O})=(x+r) \text{ needles}$$
$$y(\mathrm{Al_2O_3}3\mathrm{CaO}12\mathrm{H_2O})=y \text{ lamella}$$
$$[r+n-(x+3y)]\mathrm{Ca(OH)_2}=(r+n)-(x+3y) \text{ hexagons}$$

There is an increase in the needle crystallization at the same time as the increase in hexagonal crystallization.

The addition of hydrated alumina will increase the lamellar crystallization and the rapid absorption of hydrate of lime by the hydrated alumina will increase the rapidity of the set. There will therefore be an increase in the initial strength and an acceleration of the set.

The maximum will be reached for an addition of hydrated alumina corresponding in molecules to

$$3[n-(x+3y)]$$

or to an addition of mono-calcium aluminate corresponding to

$$\frac{3}{2}[n-(x+3y)]\mathrm{Al_2O_3CaO}$$

If we go back to the scheme of set shown above:

$$x(\mathrm{SiO_2}\mathrm{CaO}2.5\mathrm{H_2O})=x \text{ needles}$$
$$y(\mathrm{Al_2O_3}3\mathrm{CaO}12\mathrm{H_2O})=y \text{ lamellas}$$
$$[n-(x+3y)]\mathrm{Ca(OH)_2}=n-(x+3y) \text{ hexagons}$$

by addition of:

$$\frac{3}{2}[n-(x+3y)]\mathrm{Al_2O_3CaO}$$

this scheme of set will become:

$$x(\mathrm{SiO_2}\mathrm{CaO}2.5\mathrm{H_2O})=x \text{ needles}$$
$$y(\mathrm{Al_2O_3}3\mathrm{CaO}12\mathrm{H_2O})=y \text{ lamellas}$$
$$3[n-(x+3y)]\mathrm{Al_2O_3}3\mathrm{CaO}12\mathrm{H_2O}=3[n-(x+3y)] \text{ lamellas}$$

which means the disappearance of the hexagonal crystals.

It is evident that such an addition modifies at the same time the conditions of strength and of setting. In the majority of cases it is necessary to keep well below this limit to avoid having too rapid a set, not even permitting mixing.

It is therefore much simpler to determine practically the quantities to be added by a series of experiments. The results obtained by a judicious addition can be summarized always as follows:

1. Acceleration of set.
2. Marked increase of initial strength.
3. The strengths at 27 days are appreciably the same with or without the addition.

This last remark has greater force, as the lime considered is more hydraulic and approaches the composition of a cement.

The consequences of these determinations are as follows:

The light hydraulic limes are often wrongly preferred by contractors to the heavy limes because they give a more workable mortar. When these limes have but little clay content, their set is slow and their sale is difficult on large and important work.

We can easily correct the set and increase the strength, and especially the hydraulic quality, by the addition of mono-calcium aluminate, fused cements, quick-setting cements, or aluminous slag. Their sale becomes easier and they can, while retaining their character of density and quality of workability, meet the most rigorous specifications. The cost price will increase slightly, but for some factories with favorable transportation conditions these additions present considerable advantages.

### *Semi-Heavy and Heavy Hydraulic Limes*

These are generally called "Administrative" limes, and their set is slow if they are slightly aluminous.

It is easy to regulate their set by the addition of mono-calcium aluminate or fused cements. This offers a great deal of interest for hydraulic work or the manufacture of blocks.

We have been able to construct in this manner a *chalet* in 48 hours at the Exposition of Millau. The blocks were put in place a few hours after their manufacture. (Societe des Chaux et Ciments de Cap-Usclat [Tournemire], Aveyron.)

### *Extra Rapid Hydraulic Cements*

There would be an advantage for certain work under water in being able to furnish extra rapid hydraulic lime for dry mortar concrete.

By the addition of mono-calcium aluminate or fused cement, the setting of the lime can be regulated to a few seconds. We have been able at Bedarieux (Herault), to stop a leak in a canal in a few seconds (Malet, architect; Arnal, contractor; lime from Cap-Usclat). *(To be continued)*

# Structolite, a Gypsum Concrete

## A New Plastic Material That Is Especially Adapted for the Walls of Dwellings and One-Story Commercial Structures

THE United States Gypsum Co. is introducing Structolite, a new adaptation of structural gypsum, to be mixed with aggregate and poured to form the main walls and partitions of bungalows or two-story dwellings. It also has been used for bearing walls in one-story factory buildings, and is recommended for curtain, fire-stop and other walls in heavy-type industrial and commercial buildings where the principal loads are supported by steel or portland cement concrete.

The significance of this development is that it makes a highly insulated, fireproof construction available for residences at a cost that compares favorably with that of frame construction. With walls and floors adapted from the numerous poured and precast systems which have been used for 25 years, it now is possible to erect an all-gypsum house with all principal parts incombustible.

***THE new material here described promises to be in the present low-priced timber construction field what portland cement concrete is in engineering construction. Hence the two forms of concrete will supplement rather than rival one another. All producers of aggregate will be interested, as the new material will call for an increased use of their product. This description of Structolite and its properties has been furnished to Rock Products by the United States Gypsum Co. —The Editors.***

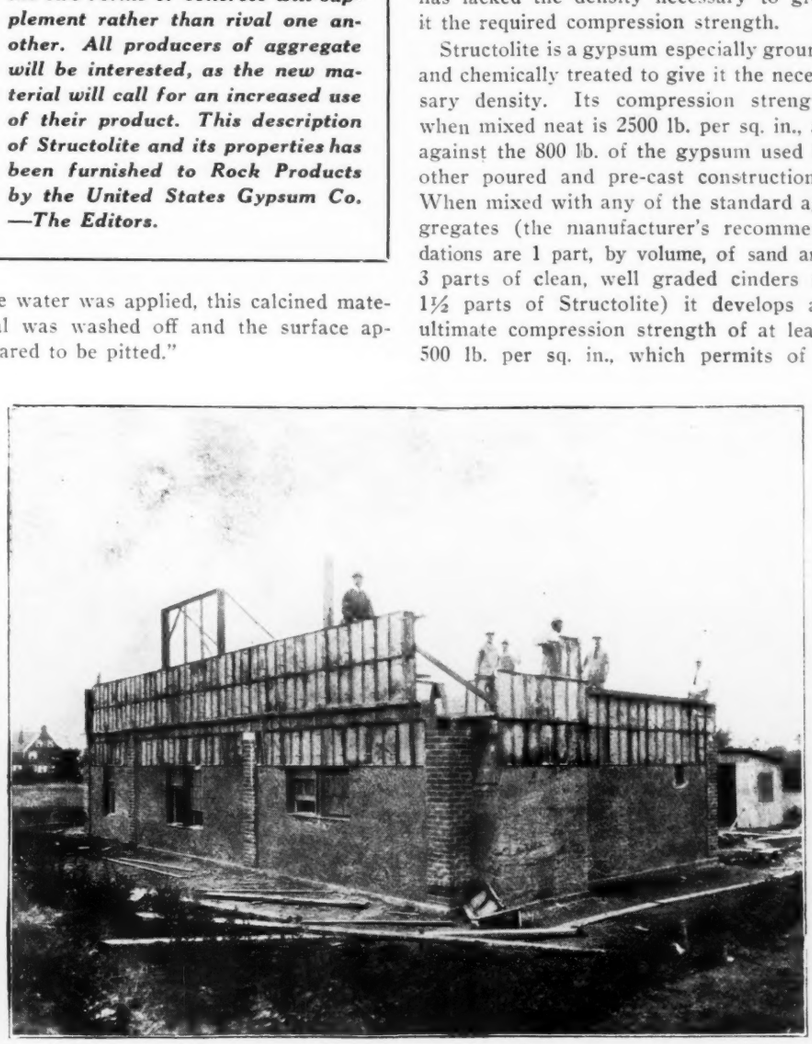
### *Properties of the Material*

1. *Fireproofing.* Fire and water tests were conducted at the testing laboratories of the department of civil engineering, Columbia University, December 19, 1923. Two test panels 3 in. thick, 9 ft. wide and 14 ft. long were erected. During the first 15 minutes temperature was maintained between 1300 deg. and 1452 deg. F. It then was raised to 1735 deg. F. 27 minutes after the fire started, and was maintained at an average of 1707 deg. F. for the remainder of one hour.

Average deflection at the end of the test was .21 in. outward, or away from the fire. Average deflection 20 hours after the test was .204 in. outward. One minute after the fire was extinguished, water from a 1⅛-in. nozzle was directed against the fired sides of the two panels, with a pressure of 30 lb., from a distance of 20 ft., for about 3 minutes. These are the conditions which brick, concrete and similar constructions must meet to be approved as fireproof under the building code of the city of New York.

William J. Krefeld, engineer of tests, and Albin H. Beyer, director of testing, commented on the results of this test as follows:

"There was no visible sign on the exterior surface of either partition that they had gone through a one hour fire and water test. . . . On the side of each partition exposed to the fire, the Structolite binder or cementing material had been calcined for a considerable depth — in places probably from 1 in. to 1½ in. When the water was applied, this calcined material was washed off and the surface appeared to be pitted."



***Structolite sets in 30 minutes. Forms from the first course may be removed as soon as the second course is poured***

Following this test, Structolite was approved as fireproof construction in the boroughs of the Bronx, Richmond and Brooklyn.

2. *Thermal Insulation.* The test report states that the temperature on the outside of the panels never exceeded 210 deg. F., while the inner surfaces were subjected to as much as 1817 deg. F. It is to be borne in mind that these panels were only 3 in. thick, while the recommended Structolite construction is from 4 in. to 10 in. thick.

3. *Bearing Strength.* Heretofore it has been impracticable to use gypsum for the bearing parts of a construction, because it has lacked the density necessary to give it the required compression strength.

Structolite is a gypsum especially ground and chemically treated to give it the necessary density. Its compression strength when mixed neat is 2500 lb. per sq. in., as against the 800 lb. of the gypsum used in other poured and pre-cast constructions. When mixed with any of the standard aggregates (the manufacturer's recommendations are 1 part, by volume, of sand and 3 parts of clean, well graded cinders to 1½ parts of Structolite) it develops an ultimate compression strength of at least 500 lb. per sq. in., which permits of a factor of safety of 10 in ordinary residential design.

Compression tests conducted at Columbia University in November, 1924, are summarized in the accompanying table.

4. *Sound Insulation.* Tests conducted at the Lewis Institute, Chicago, have established that gypsum partitions are 60%

COMPRESSION STRENGTHS OF STRUCTOLITE CONCRETE MADE WITH VARIOUS MIXTURES OF AGGREGATE. TESTS MADE ON 6-IN. CYLINDERS, 12 IN. HIGH

| | Mix, Parts of Each Material | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Structolite, 1½ Cinders, 3 Sand, 1 | | Structolite, 1½ Crushed stone, 3 Sand, 1 | | Structolite, 1½ Gravel, 3 Sand, 1 | | Structolite, 1 Cinders, 2 | | Structolite, 1 Crushed stone, 2 | | Structolite, 1 Gravel, 2 | |
| Maximum load, pounds | 19,600 | 20,550 | 21,820 | 21,500 | 13,220 | 19,880 | 31,860 | 35,430 | 22,950 | 25,730 | 22,200 | 21,150 |
| Unit stress, pounds per square inch | 715 | 750 | 800 | 785 | 475 | 715 | 1,130 | 1,230 | 825 | 925 | 800 | 760 |
| Average, pounds per square inch | 733 | | 793 | | 595 | | 1,180 | | 875 | | 780 | |

more effective as non-conductors of sound than clay tile partitions.

5. *Light Weight.* Structolite weighs only 85 lb. per cubic foot, while the weight of portland cement concrete is 150 lb. This fact means considerable savings in designing the other parts of the structure.

### Rapid Erection Possible

6. *Quick Set and Consequent Rapid Erection.* While other concrete takes days to harden so that the forms can be removed, unretarded Structolite sets in 15 minutes. This set is retarded at the factory to meet job requirements. In the usual construction it sets in 30 minutes. By that time the material acquires 60% of its ultimate strength and the forms can be removed. Owing to these facts, it is economical to use metal forms with Structolite. The rapid re-use of these made possible by the quick setting of the material minimizes the investment tied up in forms and expedites construction.

***A Structolite dwelling. As Structolite is not a hydraulic cement, the exterior must be of stucco, brick veneer, or siding***

7. *Adaptability.* Any floor-plan, any architectural treatment and virtually any roof- and floor-design is psosible with this material. Poured and pre-cast gypsum floors and roofs may be adapted to make the residence entirely fireproof. Or these parts of the building may be of slow-burning frame or ordinary frame construction. Since gypsum is not a hydraulic cement, Structolite is not recommended for exterior surfaces. The manufacturer recommends that exteriors be of stucco, frame or brick veneer.

### Methods of Handling

In the typical Structolite house the foundation, of masonry or cement, is carried at least 18 in. above the grade line to prevent water absorption, and its top surface is covered with a sheet of 40-lb. roofing felt or with "R.I.W." or an equivalent damp-proofing compound.

One course of forms is adjusted around two or more sides. Window-frames and door-bucks are set in place while the forms are being adjusted. All corners and openings are reinforced by steel rods or steel web fabric. In bungalows or other one-story constructions, the outside walls are at least 6 in. thick; in two-story buildings, 8 in. or more. Partitions are 3 in. or 4 in. thick and closet-walls, 1¾ in. or 2 in.

Mixing may be done either by hand or in a drum type batch concrete mixer, care being exercised in the latter case to keep the drum clean so that no crystallized particles of gypsum accelerate the set of the bulk of the material. All walls and partitions are carried up simultaneously, the forms from the first course being removable by the time the second course is poured.

It is recommended that ⅜-in. of plaster be applied directly to the Structolite frame to provide the interior finish. This eliminates the cost and fire-hazard of lath or furring. The outside of the frame should be covered, as soon as the superficial moisture has dried out, with a damp-proofing compound. Then it is ready for the exterior finish.

In case this is to be stucco, the wall is scratched and then a 2x2-in. electrically welded wire fabric is stapled on and covered with ¾-in. of approved stucco. If the outer finish is to be of drop siding or other wood lumber, vertical furring strips are nailed directly to the wall and the lumber to these. If a brick veneer is desired, anchors may be driven into the wall or cast in place, to be imbedded in the brick course.

### Past Uses of Structolite

Although now receiving its first introduction to the building industry in this form, Structolite has been used successfully in reinforced roof construction for about eight years. Its first use as a binding material for aggregates was three years ago when garages and service stations were built of it.

Later it was used in bungalow-type homes and then in two-story dwellings. In each case the material met every condition presented by that type of construction. It also has been used for bearing walls in one-story factory buildings where there are no heavy concentrated loads.

Eleven two-story residences of Structolite are being erected in Yonkers, N. Y. In the first unit of 20 dwellings in Cohoes, N. Y., municipal building project, 10 Structolite houses are under erection and five more are contemplated. Other constructions are either contemplated or in various stages of progress at Garden City, Long Island; Fort Dodge, Iowa; Mt. Vernon, N. Y., and other places.

### Shipped in Sacks

Structolite is shipped in 100-lb. jute sacks or 80-lb. paper containers. It is produced by the United States Gypsum Co. at Fort Dodge, Iowa; Gypsum, Ohio; Oakfield and New Brighton, N. Y., and Loveland, Colo. Eventually it will be manufactured at all the other plants of the company.

Specifications for the use of the material and further information concerning it may be had from the fireproofing department of the company at its headquarters, 205 West Monroe street, Chicago.

# Committees of the National Crushed Stone Association Promise Interesting Program

## Sectional Meetings for All Interested in Promoting Some Phase of the Quarry Industry

A NEW feature at the coming convention of the National Crushed Stone Association at the Hotel Gibson, Cincinnati, Ohio, January 12 to 15, inclusive, will be open committee meetings on some of the major problems of the quarry industry. These committees were appointed by President John J. Sloan several months ago, and they have been busy ever since on the jobs assigned to them.

These committees are as follows:

### RESEARCH COMMITTEE

Harry H. Brandon, Ohio Marble Co., Piqua, Ohio, chairman.
N. C. Rockwood, ROCK PRODUCTS, Chicago, Ill.
W. H. Hoagland, Marble Cliff Quarries Co., Columbus, Ohio.
A. L. Worthen, Connecticut Quarries Co., New Haven, Conn.
I. W. Wortman, Morris County Crusher Stone Co., Morristown, N. J.
Vincent Sloan, Universal Granite Co., Chicago, Ill.
J. F. Schroeder, Linwood Cement Co., Davenport, Iowa.
J. J. Sullivan, Consumers Co., Chicago, Ill.

### BALLAST COMMITTEE

John Rice, General Crushed Stone Co., Easton, Penn., chairman.
F. T. Gucker, John T. Dyer Quarry Co., Norristown, Penn.
James Savage, Buffalo Crushed Stone Co., Buffalo, N. Y.
H. E. Bair, France Stone Co., Toledo, Ohio.
W. W. Boxley, W. W. Boxley Co., Roanoke, Va.
A. R. Wilson, Granite Rock Co., Watsonville, Calif.
F. C. Murphy, Brownell Improvement Co., Chicago, Ill.
B. D. Pierce, Connecticut Quarries Co., New Haven, Conn.
J. W. Cooke, Virginian Limestone Corp., Roanoke, Va.
B. R. Babcock, Callanan Improvement Co., Albany, N. Y.
W. G. Swart, Mesabi Iron Co., Babbitt, Minn.

### HIGHWAY COMMITTEE

H. M. Sharp, France Stone Co., Toledo, Ohio, chairman.
H. B. Allen, North American Bldg., Philadelphia, Penn.
Geo. E. Schaefer, General Crushed Stone Co., Rochester, N. Y.
W. Scott Eames, New Haven Trap Rock Co., New Haven, Conn.
W. L. Sporborg, Rock-Cut Stone Co., Syracuse, N. Y.
C. M. Doolittle, Canada Crushed Stone Corp., Dundas, Ont.
C. B. Magrath, Consumers Co., Chicago, Ill.
A. N. Spencer, Columbia, Mo.
R. W. Lutz, Lutz Stone Co., Oshkosh, Wis.
Norman Hely, Cape Girardeau, Mo.
W. F. Wise, Stringtown Crushed Rock Co., McAlester, Okla.
F. W. Connell, Indiana Crushed Stone Association, Indianapolis, Ind.
R. B. Tyler, R. B. Tyler Co., Louisville, Ky.

### CONCRETE AGGREGATE COMMITTEE

John D. Ohrt, Davis Bros. Stone Co., Lannon, Wis., chairman.
R. W. Scherer, Western Lime and Cement Co., Milwaukee, Wis.
B. T. Van Camp, Van Camp Stone Co., Cincinnati, Ohio.
C. P. Tigges, Columbia Quarry Co., St. Louis, Mo.
O. P. Chamberlain, Dolese and Shepard, Chicago, Ill.
A. C. Hunt, Northwestern Quarry Co., Rapid City, S. D.
Thomas Sullivan, National Stone Co., Omaha, Neb.
J. L. Heimlich, LeRoy Lime and Crushed Stone Corp., LeRoy, N. Y.
R. Hammerschmidt, Elmhurst - Chicago Stone Co., Elmhurst, Ill.
E. S. Hanson, Cement Mill and Quarry, Chicago, Ill.
John H. Odenbach, Dolomite Products Co., Rochester, N. Y.
Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio.
Thos. McCroskey, American Limestone Co., Knoxville, Tenn.
A. G. Seitz, Rock-Cut Stone Co., Syracuse, N. Y.
Franklin H. Miles, Tomkins Cove Stone Co., 30 Church street, New York City.

### SALESMANSHIP COMMITTEE

Harry H. Brandon, Ohio Marble Co., Piqua, Ohio, chairman.
Geo. E. Schaeffer, General Crushed Stone Co., Rochester, N. Y.
F. S. Lack, Lack Limestone Co., Paducah, Ky.
J. H. Heintz, Columbia Quarry Co., St. Louis, Mo.
A. J. Hooker, Buffalo Crushed Stone Co., Buffalo, N. Y.
Ellwood Gilbert, New Castle Lime and Stone Co., New Castle, Penn.
I. W. Wortman, Morris County Crushed Stone Co., Morristown, N. J.
J. R. Yearwood, Bluffton-Lewisburg Stone Co., Lima, Ohio.

### LIME AND LIMESTONE COMMITTEE

E. M. Lamkin, Kelley Island Lime and Transport Co., Cleveland, Ohio, chairman.
Thomas McCroskey, American Limestone Co., Knoxville, Tenn., vice-chairman.
Ellwood Gilbert, New Castle Lime and Stone Co., New Castle, Penn., secretary.
J. J. Sullivan, Consumers Co., Chicago, Ill.
J. C. King, Carbon Limestone Co., Youngstown, Ohio.
E. J. Krause, Columbia Quarry Co., St. Louis, Mo.
O. P. Chamberlain, Dolese-Shepard, Chicago, Ill.
E. C. Dodson, Texas Stone Products Co., Dallas, Texas.
W. H. Margraf, Marble Cliff Quarries Co., Columbus, Ohio.
C. H. Ruedebusch, Mayville White Lime Works, Mayville, Wis.
W. W. Fischer, Greenville Stone and Gravel Co., Memphis, Tenn.
Fred Murphy, Brownell Improvement Co., Chicago, Ill.
G. H. Faist, Woodville Lime Products Co., Toledo, Ohio.
R. G. C. Harstone, Canada Crushed Stone Corp., Dundas, Ontario.
J. T. Fowler, The Jeffrey Mfg. Co., Columbus, Ohio.

#### *Research Committee Plans Exhibit*

Chairman Brandon of the research committee writes that he has plans for the committee to have a booth in the exhibit hall, or adjacent to it, to show samples of crushed-stone products, samples of promotional literature, etc. This will certainly be an attractive feature of the convention. Mr. Brandon writes further of his plans for the meeting of the research committee as follows:

"It is the hope of the research committee to develop a program of research that will not require any considerable investment, but that will cover a sufficient amount of research work to arouse a keener enthusiasm amongst American crushed-stone producers.

"There is an unlimited field for research in the crushed-stone industry in the development of new greatly diversified list of uses for crushed stone. This type of research work would probably require a considerable investment, and it does not seem to be the general attitude of the crushed-stone producers to support this program in a financial way to the extent required to really dig into and develop additional uses of stone.

"It may be that the establishment of a fellowship in some of the research bureaus already established is desirable to initiate research into the crushed-stone industry. This fellowship might very profitably be devoted for a year or two to compiling and tabulating the present uses of stone, the specifications of stone for various purposes and supply the crushed-stone producers with a better and more complete knowledge of the fundamental uses of stone that are already developed.

"No definite outline has been made at this time to cover the activities of the Research Committee at Cincinnati convention, it being somewhat the general opinion that this program can be very satisfactorily developed during the progress of the convention."

### *Sales Committee Program*

Regarding the program of the Sales Committee, of which Mr. Brandon is also chairman, he writes: "The program of the Sales Group will be very definitely defined prior to the convention and at this time a special committee appointed by President J. J. Sloan is working to outline the work.

"The salesmen of the crushed-stone industry face conditions heretofore unknown and unexperienced by stone producers. The vast amount of publicity and research work done by organizations representing competitive materials have placed the crushed stone salesmen to a more or less disadvantage in a great many communities.

"The fact that in the past the chief source of concern to the executives of crushed stone operation has been quantity production, has caused these executives to devote more time and energy to questions of production than to sales problems.

"This condition has changed very materially during the past few years. The rapid development of new large capacity plants throughout the country has developed the condition of over-production and at this time the crushed-stone producers are confronting the problem of efficient promotion, advertising and sales.

"In the days of old, selling prices were established on the basis of cost of production, it being practically unnecessary to spend any considerable amount of money in advertising, promotion and sales efforts. However, at this time it is necessary for the individual crushed-stone producer to have a well defined, well worked out promotion, advertising and sales organization.

"This is rather a difficult problem in the crushed-stone industry because in the past we have established a more or less fixed value to the ton of stone. This value did not include an amount to cover the cost of creating and operating an organization of this kind.

"These are just a few of the suggested problems that will probably be discussed at the Sales Group meetings. No doubt as the construction of this program continues a number of other problems will be developed and brought to our attention. However, we do feel that the Sales program is going to be one of unusual interest and one that will arouse unusual interest and one that will be well worth the support of everyone supporting this convention."

### *Highway Committee Chairman Makes Suggestions*

H. M. Sharp, chairman of the Highway Committee, has made the following tentative suggestions, through the Bulletin of the National Crushed Stone Association:

"Stone industry is divided into two sections: (a) Producing, (b) Marketing.

"Marketing: Ballast, highways, buildings and other structures, agricultural stone, miscellaneous.

"Highways: (1) Merits and uses of crushed stone in highways. (2) Distribution of crushed stone.

"Distribution of Crushed Stone: (Through salesmen).

"Some subjects which might well be discussed and developed in the group meetings of the highway committee:

"(1) What should a salesman know about highways and highway construction?

"(2) Crushed stone in highway building the last twenty-five years.

"(3) Tonnage of stone required for a mile of 18-ft highway of various types.

"(4) Stone screenings for highway use.

"(5) Stone for hot-mix pavements.

"(6) What some highway departments think of crushed stone for highways.

"(7) Sizing of stone for highway construction.

"(8) Advancing the use of crushed stone in highways.

"(9) Crushed stone in comparison with competing materials in highway construction.

"(10) Some ways for the producing section or operating group to co-operate with the marketing section or sales group for the good of the whole industry.

### *Other Subjects to Develop*

"(1) To sell well the salesman needs to know all he can learn about the material he is selling and the use of such material. Stone salesmen must meet two groups of men: Group 1—non-technical; officials, tax-payers, citizens. Group 2—technical; engineers.

"(2) It is interesting and valuable to know the history of the material you are producing and selling relative to highway construction over a considerably long period of years.

"(3) There are a number of recognized standard types of pavements. We should know the tonnage of crushed stone of the different sizes required for each mile of the various types of pavements.

"(4) At a good many stone plants stone screenings are a sort of waste product—often sold at a lower price than the crushed, screened material. If properly prepared, stone screenings of the right quality can be substituted for sand in concrete work. There are other ways of utilizing and marketing stone screenings for highway work to the benefit of the producer.

"(5) Crushed stone can be used more extensively in hot-mix pavements than heretofore has been the practice. Sizing and grading of crushed stone are the most important things in the way of hot-mix pavements.

"(6) Some state highway departments prefer crushed stone to gravel and other competing materials. Others are of just the opposite opinion. We should know more of the reason for those different views.

"(7) Sizing of stone, of course, is a great problem always confronting the producing department; however, from the viewpoint of the salesman and the marketing division, sizing can be viewed from a different angle. Discussion along this line would be interesting.

"(8) Thousands of dollars have been spent in investigation and research to improve cement, cement products, concrete roads, brick, brick roads and bituminous products. How much time and money have been spent to advance the use of stone products in highways? What have we done to assure the use of the tonnage specified or to protect ourselves against the use of less tons in a mile of road than called for by the specifications?

"(9) There are many arguments for and against the use of crushed stone in comparison with competing materials in highway construction. What would be more interesting than the development of this subject?

"(10) Everybody connected with the stone industry knows the value of close co-operation and work between the producing and the marketing departments of the business.

"Note: These are simply suggestions and comments by your Chairman. There are many subjects worthy of discussion by the Highway Committee. To bring these out and to formulate the best program, we need the suggestions and comments of every member of the committee and anybody else connected with the stone industry. We depend upon you to contribute your suggestions, after which a selection will be made for the best program and the full discussion and development of this program."

# Hints and Helps for Superintendents

## Advantages of Electric Shovels

By W. E. McCLASKEY
Manager, the Bascom Quarries,
Bascom, Ohio

SOME time ago I received a letter from ROCK PRODUCTS asking that I give you information for an article. Due to the fact that we have been pretty busy this year, and also due to the fact that this is out of my line of business, I have neglected writing sooner, but I will now do my best to give you the information you desire in regards to electric equipment and electric operation. To do so will have to give you a description of our operation. We have a No. 6—electric power throughout—crushing plant, getting out stone for all commercial uses and 80% of our output is truck haul, which makes our business spasmodic. To illustrate, maybe we arrive at our plant some morning and some unforeseen thing happens to a contractor and he does not take stone for an hour or two, or maybe all day, or it may rain during the day or there may be a breakdown in our plant to delay our quarry equipment. In this case we receive a saving with our electric shovel above the steam shovel. At a moment's notice it is ready to dig stone. Expense? Just while operating; no night man is required to have steam up in the morning; no fireman during the day to be on the shovel to keep steam up during such delay; no team or cars or any labor expense in conveying coal to shovel; no coal going to waste; no ashes to be dug and mixed with the stone (which is true of steam operation); no pump and water-line to keep boiler supplied with water. To me, these two items, water-line and coal, are a big saving in themselves.

You can see by this we have saved a fireman and a watchman, which would amount to about $8 a day, and the expense of coal and upkeep of water-line, besides all the difficulties you have with water-lines, especially in freezing weather.

Now we have arrived at the shovel. In the beginning, the first cost of the electric shovel seems a little above the steam, but in describing it will honestly say that to us it is a saving. Being a shovel man myself, I investigated the electric machines very closely before purchasing our Model 32. I first found the one-motor operating machine. By this I mean one motor furnishing power for what I would call three operations, hoist, swing and thrust. This being done by hand friction, which in turn is harder on the operator to keep in adjustment and also to operate, gives the machine an excess power on one or two operations at one time and a lesser power when all three operations occur at the same time, which is sometimes the case. Then after the single motor I investigated the three-motor control machine. This machine is operated identically as a steam shovel, as you have a motor for your hoist, one for your swing and one for your thrust.

As to the upkeep on this machine, so far it has been far cheaper than steam, our only trouble being with contacts and contact-fingers, which cost has not exceeded $6. Our oil consumption on our electric shovel is very light, changing and filling motor wells about twice a year, taking about six gallons of oil to fill them. Approximately one gallon a month will keep them replenished against the steam outfit, which takes about a gallon of high priced oil a day, which you will see is quite an item.

So far as trouble with electric equipment is concerned, we have not had enough to speak of, and in starting this machine I broke in a man that had had no previous experience with very little difficulty. Today he can do anything with electricity that can

*View of the Bascom Quarries*

*Left—The shovel loading into cars. Right—Working in large size pieces*

be done with steam. As to power, we have more than we would have with steam. As to repairs on shovel, will state we close its doors on Saturday night, the same as our office, until Monday morning. There has only been one Sunday that it was necessary for a man to work on it, since we purchased it nearly two years ago, and everybody knows what the Sunday work is on a steam machine; boiler to wash every two weeks, and water conditions in some quarters make it necessary every Sunday, besides engines and pump to pack and new flues in boiler about once a year.

***Note the pipe return chute, the guard rail, and bumpers***

Our shovel is a Model 32 Marion, equipped with a 1¼-yd. bucket with crawler tread. This makes it very economical for small quarry operation. We have handled, approximately, 100,000 tons with it.

If orders are slack and we have a day now and then, and have a full crew of men working, we are able to put our shovel on top and do stripping just for one day, back down the quarry face and be ready to dig stone the next. However, there is no difference between electric and steam shovels, as far as this operation is concerned.

As to operation, we were operating by hand up until the time we got our shovel. The year's production with the shovel has been approximately one-fourth more with fewer men required. As this kind of labor is scarce in this locality, it also makes stripping much more convenient. With our five-ton truck and electric shovel and their respective operators, we can strip from 300 to 400 yd. of stone per day at a considerably low cost per yard.

The power is delivered in a circuit line around the quarry. We have tapping-in plugs on these lines, making them interchangeable with shovel and well drilling machine, and from the cable to the machine we have a rubber-covered mining cable to drag along behind the machine, which makes it convenient to move the shovel.

## A Good Crusher Feeding Arrangement

THE installation of a No. 7½ gyratory crusher at the plant of the National Stone Co., near Omaha, Neb., is not particularly novel but it has some points that make it worth noting in this section. The first of these is the directing boards by which the flow of rock to the crusher is guided. A guard rail, which is a good safety appliance, connects these. Beyond on the feeder floor are bumpers which prevent rocks which roll over the crusher from falling below, where they are troublesome to clean up if they do no damage.

The chute for the return oversize from the screen above is a pipe directed into the mouth of the crusher. This obviates the spilling of material and is altogether a much better contrivance than an open chute.

While there is nothing especially new in any of them, the combination of these details is a good one.

## Insulating Steam Pipes

By W. F. Schaphorst, M. E.

IMPORTANT steam lines should be well insulated, for the simple reason that good insulating reduces heat loss from 60 to 80% and more.

The insulation that is very commonly recommended is what is known as "85% magnesia"—which is a mixture of 15% asbestos and 85% carbonate of magnesia. On high pressure steam pipe, 2 in. and smaller, a thickness of 2 in. should be used; between 2 and 8 in. use a 2½-in. in thickness, and on larger pipes use 3 in. Thinner insulation may be employed on lower temperature lines.

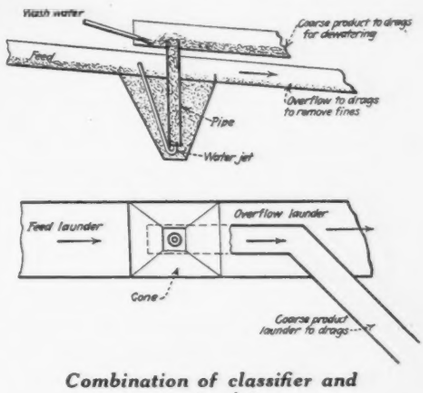
There are many manufactured forms of insulation that come in rolls, sheet form, corrugated forms, in loose plaster form and for hot underground pipes a wooden cased asbestos, waterproofed type is commonly installed. In cases where heat is valuable almost any kind of insulation is better than no insulation at all.

## Combination of Classifier and Water Jet

THE classifier shown in the accompanying line cut was designed by C. W. Tandy, of the Utah Copper Co. It is a simple pocket classifier with a jet, or hydraulic elevator, by which the coarse product is lifted to a higher level than that at which the feed enters. It is described in the *Engineering and Mining Journal Press.*

Those familiar with the washing of Tennessee phosphate rock will remember that a similar device, of much larger dimensions, is used for washing phosphate sands. It is described in the article on the Charleston plant in Rock Products for November 29.

The amount of water required to operate the jet varies with the available head. At least 5 ft. head is required to lift 1 ft. The greater the head in addition to this 5 ft. to 1 ft. the less water may be used. With high pressures a thick product may be lifted, containing as much as 50% solids.




***Combination of classifier and water jet***

This device is one that might well be used in sand plants where two sizes of sand are made.

## "Synthetic" Sillimanite a Good Refractory

EXPERIMENTS at the Seattle station of the U. S. Bureau of Mines have established, it is declared, that "artificial sillimanite" is an excellent refractory material. It is necessary, however, to prevent an excess of silica, and lime in excess of 1.5% causes a serious reduction in the melting point. Iron oxide and magnesia likewise are said to affect it adversely. Natural sillimanite is a silicate of alumina ($Al_2SiO_5$) which is much used for making the refractory bodies of spark plugs. It occurs at a number of places along the Atlantic coast.

# Co-operative Selling in the Slate Industry

## Demonstrated by the Structural Slate Co., Pen Argyl, Pennsylvania

POSSIBLY the war entered into the formation of this company more than it did into that of the Natural Slate Blackboard Co. (see ROCK PRODUCTS for December 1, 1923) but otherwise the causes which made its existence imperative were the same. Primarily, they are traceable to the former inability of the producers to act in harmony yet at the same time attempting to conduct business on a national scale as small individual operators who must prepare their goods at the quarry. If Nature had placed slate deposits throughout the country as she did limestone, sand, etc., the marketing problem would not be so difficult. Under these conditions the individual operator would have his "sphere of influence" and competition would not be so deadly. However, Nature was not so generous, but concentrated all the slate in three or four small localities.

It was the war which really opened the eyes of the slate men. The commodity was declared a non-essential, a decision that came near being the death blow to the industry. They tried as individuals to get business from the government and their initial success was a boomerang. One man secured an order for structural slate only to find that he could not prepare it in the time allotted. The order was canceled and the industry as a whole was badly hurt.

Conditions were such that the government practically told the slate men to organize their industry; otherwise business would not be done with small competing operators. Inroads in the business by manufacturers of the substitute materials were slowly strangling the slate industry. It was imperative that, as in the case of blackboards and roofing slate, some central distributing agency be set up which could draw to itself all available slate production, act in a storage capacity, and distribute the product; thus helping to stabilize the entire industry. The Natural Slate Blackboard Co. formed in 1916 was proving a success so it was decided to fashion the new company after that.

In 1918 the Structural Slate Co., a $250,000 corporation, was formed along the lines of its companion company and under the same management. Its activities are confined to selling structural (including electrical) slate. It was foreseen that there might be trouble when it came to apportioning the orders received; so it was decided to prorate business according to the production records of the member quarries dating back several years. That seemed to be the fairest way but today the rule can be waived as the quarries cannot begin to take care of the orders that are on hand. The producer receives 75 per cent of the value of his production made on orders on the 10th of the following month.

*Typical slate-milling plant in the Bangor district of Pennsylvania*

*Typical Pennsylvania slate-quarrying operation*

Its problems are somewhat different than those of its sister company, in that the market is much more diversified and offers greater potential growth. This fits in nicely with the nature of slate deposits, inasmuch as far more structural than blackboard slate can be obtained from quarries; so it is well that the structural slate market offers greater possibilities.

While the company does considerable publicity work, both direct and indirect, great personal effort is necessary to overcome the work done by the manufacturers of other materials. Whenever a structural slate salesman sees a place to use slate instead of something else he hammers away until slate is tried.

### *Twelve Legitimate Uses for Slate*

As an interesting example of some of the many uses to which slate may be put, the garage built by Mr. Male, president of the

company, is an excellent case. He has used slate in 12 different ways and each way is legitimate. They are: wainscoting, door sill, window sill, top of stone wall, walk (flagging both large and small), floor tile, bases for wooden columns, window boxes, sink, bench, oil tank and shingles. These are for uses around a house but there are many other ways in which slate may be used such as baths, toilets, sewage disposal tanks, laboratory bench tops, etc.

The electrical slate department is in charge of an electrical engineer who investigates every piece of the electrical apparatus manufactued and, if slate can be properly used therein, leads the campaign to make the manufacturer change from substitutes to slate. They have already been quite successful in several instances.

***Slate-shingle industry in Pennsylvania***

***Hand methods of manufacture and handling still prevail***

***Literature That Is of Help to the Slate Buyer***

The literature published by the company covers not only every possible use for slate but also instructions for its installation. Proper methods for drawing up specifications are included; in fact, everything which a consumer of slate needs to know about the material he has bought. This is really a service which is not given by many manufacturers of materials which have enjoyed a market for many years. This company has recognized that service is not only essential to increasing the uses of slate but also that the consumer is entitled to it.

The company has frankly laid all its cards face up on the table and offers for sale an article which is, for many purposes, far superior to anything which can be made. There is nothing mysterious about slate; it is a natural stone, the quality of which man does not change; he changes only its utility from place to form.

As a trade-mark the company has adopted the Pyramids together with the following mottos:

1. Centuries of service;
2. Proof against Time—Wear—Water—Fire.

What product manufactured by man can duplicate this?

## New Modern Lime Plant to Be Built in the Argentine

A LARGE lime plant is to be built by Ramon Ferreyra at Cardoba, Argentine, shortly. The first unit of this plant will have a capacity of 100 tons of lime daily and will be followed immediately by two other units which will bring the total capacity up to 300 tons daily. A hydrating plant with a capacity of 50 tons a day will also be built and this will be the first hydrating plant in the Argentine. The new plant will be equipped with the most modern appliances for the economic production and handling of lime and hydrate. Richard K. Meade and Co., the consulting engineers of Baltimore, Md., have prepared the plans and specifications.

## New Colorado Lime Plant Begins Producing

THE Pueblo Lime Co., which is erecting lime kilns and a crushing plant on the Fountain river in Pueblo, Colo., promises to be the largest west of the Missouri river when in operation at capacity.

One kiln has been completed and has been fired. Within a week to 10 days from the date of firing, local trade will be furnished lime from this unit.

Lime rock from what is said to be one of the best quarries outside of Missouri has been procured by the Pueblo Lime Co. from a limitless deposit near Salida, Colo. It is shipped to Pueblo and is placed in latest type of combustion chamber kilns. The kilns are capable of turning out 10 tons per day each and with a battery of five, which will be the size of the local plant when completed, will be enabled to turn out more lime than any other plant or several plants in the state.

The kilns at the Pueblo plant are so constructed that they burn all the smoke and soot, as well as the coal that is used as fuel. This burning of all combustible material insures a smoother and more complete burning of the lime rock.

"Personal and foreign tests of rocks from the quarry near Salida show that they range from 99 to 99.3% pure in lime content," according to J. D. Thomas, who is manager of the new plant—*Pueblo (Colo.) Star-Journal.*

## New Pumice Deposits in Kansas

FREDERICK T. MARTIUS, consulting engineer of Kansas City, Mo., writes Rock Products of a newly discovered bed of pumice (volcanic ash) in Kansas, about 230 miles west of Kansas City. It covers a 40-acre tract, ranges between 10 and 23 ft. in depth, and is fairly close to a railroad. Mr. Martius estimates that the deposit will contain 1,500,000 tons. The color is pure white and the fineness is such that 70% will pass a 200-mesh screen.

Pumice has a widely increasing use in cleaners, soaps, and in refining and decoloring petroleum products. It has many minor uses as an abrasive. The owners of this deposit contemplate organizing a company to develop it and work it on a large scale.

# A Well-Planned Unloading Plant

## Graham Bros., Inc., Has Installed Unloading and Distribution System to Handle Catalina Island Rock in Southern California Ports

By O. E. Warburg

THE main distribution plant of Graham Bros., Inc., whose plant on Catalina Island was described in the February 23rd issue of ROCK PRODUCTS, is located at Long Beach, Calif.

Long Beach, being a fast-growing city, with considerable building going on, makes a wonderful market for building materials. The estimated population of Long Beach in 1924 was 125,000, against the census taken in 1920, which was 55,593, which shows the rapid growth for the past four years.

Long Beach is fortunate in having a harbor with considerable water frontage which adjoins Los Angeles harbor. A short time ago bonds were voted to improve this harbor so that in time Long Beach will also be a shipping center. It is here that the loading bunker has been placed by Graham Bros. Being at the center of the harbor, materials can be delivered rapidly and in large quantities to any harbor project. Also this bunker is but a short distance from the town of Long Beach, and by means of railroad spur tracks, carload shipments can be made to points beyond the radius of truck hauls.

The business of Graham Bros., Inc., is an outgrowth of the partnership business of Robert Graham and Paul C. Graham, who have lived in Long Beach since 1909. They began this particular venture in 1919 in a very limited way. Due to the growth of Long Beach and to their energetic management, the growth of the business has been beyond their most sanguine expectations.

When Long Beach began to take on metropolitan proportions it became evident that business would be greatly hampered in its service and growth unless it secured its own source of supply of rock and sand. The supply then coming from the foothills north of Los Angeles was very uncertain. Accordingly, the business was incorporated under its present name, the Graham brothers retaining the active management.

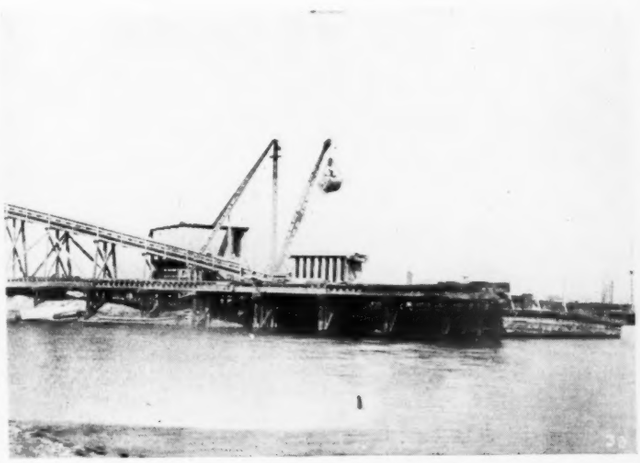
An unlimited supply of high-grade rock was located on Catalina Island and a long-term contract entered into with the Santa Catalina Island Co., giving Graham Bros. the exclusive right to quarry and sell rock from that source. A modern crushing plant was erected there capable of delivering, with its present equipment, 2000 tons of crushed rock per day. Due to the favorable physical conditions of the quarry, its capacity can be greatly increased as necessity requires.

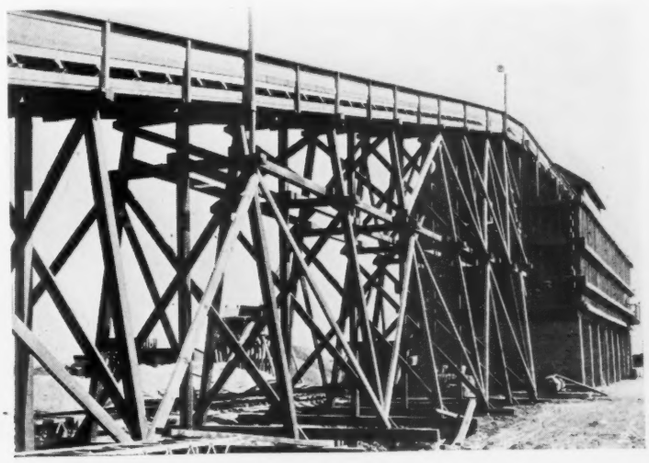
*The Long Beach unloading and storage plant of Graham Bros., Inc.*

In addition to its unloading plant on Long Beach harbor, the company also operates an unloading plant in San Pedro and one in San Diego; consequently it has as a market for its output the entire Los Angeles-Long Beach harbor district as well as the city of San Diego. It is also possible to develop markets at any point from San Diego to Santa Barbara wherever facilities are obtainable.

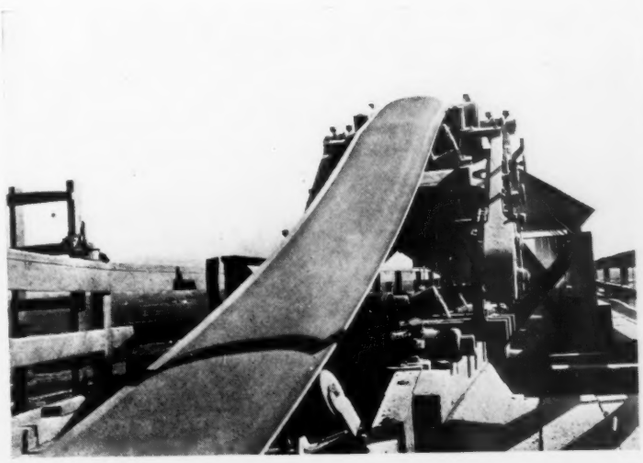
The screened rock is transported from the crushing plant on Catalina Island, about 30 miles, on barges of 500 to 1200 tons capacity. These barges are towed from Catalina Island to Long Beach by Diesel tugs operated by the Wilmington Transportation Co.

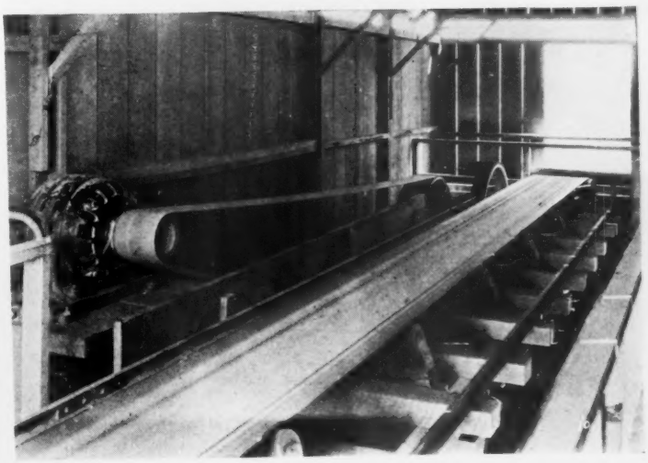
The crushed and graded rock is removed from the barge by a 1½-yd. clamshell bucket, steam operated by a 40-hp. boiler and engine. The material is dropped into a hopper of 20-yd. capacity under which is a 24-in. belt conveyor. The material is fed on the belt by an adjustable cut-off gate and is carried up to the top of the bunker.



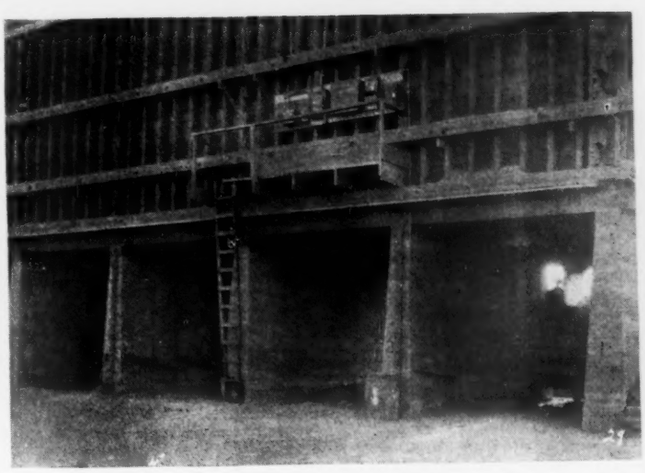


***Left—Wharf with derrick and hopper. Right—The conveyor structure***





***Left—Tripper above bins. Right—Conveyor drive***




***Left—Bins for loading trucks. Right—Scale house and scales***

The belt conveyor has 330-ft. centers, with an inclined section about 230 ft. long and a horizontal head section above the bins about 100 ft. long. The total rise of the conveyor is about 40 ft. This conveyor equipment is of the Stephens-Adamson Manufacturing Co. design, and the belt-conveyor carriers have S-A standard unit ball bearings. The conveyor has a head-end, spur-gear drive, and is driven by a 30-hp. 900-r.p.m. Fairbanks-Morse, Type "H," dust-proof, ball-bearing, electric motor, which is an ideal motor for this service. The elongation and contraction of the belt is automatically compensated for by an S-A gravity take-up.

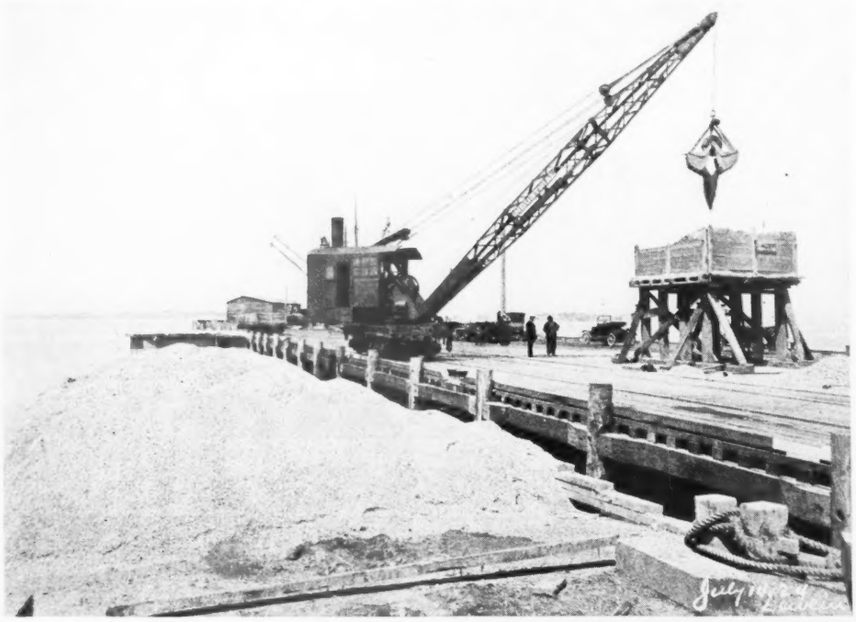
The storage bin is 30 ft. wide, 100 ft. long, and 20 ft. deep, divided into 16 compartments. By using this number of compartments, it can store several grades of rock and sand in proportions consistent with the market demands.

The material is unloaded from the belt by means of an S-A self-propelling, self-reversing tripper complete with a three-way discharge spout and revolving brush. This tripper can be moved to any one of the compartments. By using a three-way spout on the tripper, rock can be delivered into bins on either side of the belt or unloaded over the head pulley of the conveyor to ground storage or directly into railroad cars. By the addition of a brush the belt is kept clean at all times and consequently the life of the belt is increased. The belt used is an S-A Special, 6-ply, with ⅛-in. rubber cover on the carrying side.

The bunker has a storage capacity of 3000 yd. and the material stored is loaded into motor trucks or railroad cars. Trucks load from underneath the bunker by means of quick cut-off gates which are under lock and key. The railroad cars are loaded by quadrant cut-off gates located on the side of the bin. The spur track is parallel to the length of the bin and just standard railroad clearance from the bunker.

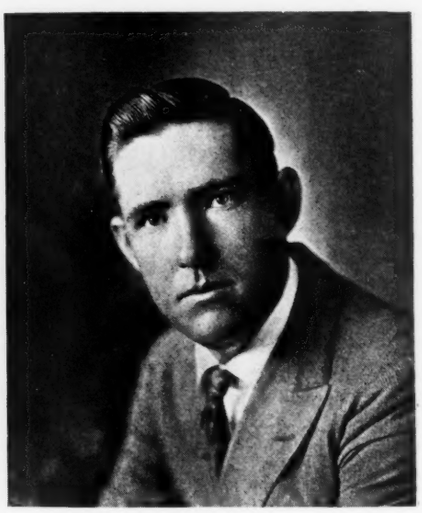
When material is hauled by truck it is accurately weighed on a 20-ton Type "P" Fairbanks scale. Weighing the material saves grief in a good many ways as compared with the old yardage basis of selling. It saves all argument as to weight, for the customer receives a certified weight ticket showing just the amount of material he has received. By the yardage basis it was a matter of guess work as to the actual amount of the material delivered, and in case of a dispute as to shortage, the seller had to make good. This scale actually paid for itself in six months from the time it was installed. The company now has four of these scales in its plants.

The construction work was done by Graham Bros., Inc., engineering services being rendered by the Stephens-Adamson Manufacturing Co. from its Los Angeles office.



***Graham Bros., Inc., unloading plant at San Diego***

***Robert Graham, president***



***Paul C. Graham, vice-president***

## Cement Contract for Merced Dam Awarded

THE Pacific Portland Cement Co., San Francisco, has been awarded the contract for cement for the Merced Irrigation Exchequer dam. The company was recently defendant in a suit seeking to restrain it from carrying out its contract with the district.

The price offered by the winning company was $3.32 a bbl. A refund of 40c a bbl. for return of sacks, and also 5c a bbl. for cash, will cut $129,000 from the total cost. The cement necessary will be between 300,000 and 400,000 bbl.—*Oakland (Calif.) Tribune.*

## White Cliffs, Arkansas, Quarry and Plant Sold

THE White Cliff properties, $350,000 stone and lime quarry near Ashdown, Ark., were sold at auction December 9, and Krippendorf Tuttle, president of the old White Cliffs Products Co., aided by Little Rock capital, is planning to install a 2000 bbl. cement plant and other improvements that will make a $2,000,000 plant.

The Tuttle interests will completely reorganize the company, according to the information reaching here. The cement enterprise will become southwest Arkansas' leading industry, it is believed by the promulgators.

The White Cliffs plant is now furnishing asphalt filler, a crushed stone, for paving improvements in Texarkana. Besides this, the plant produces several other commodities, chief among which are limes for farm fertilization.—*Texarkana (Ark.) Texarkanan.*

## Missouri Gravel Company Adds New Equipment

THE Halleck and Hill Gravel Co., owners of the Bloomfield, Mo., gravel pits, have recently purchased a 66-ton locomotive from the Kansas City Southern railway.

They have also bought an additional 60 acres of gravel land lying northwest of the present pit. This land will be cleared during the winter. They will also install a new steam shovel and their capacity will be more than doubled.

It will require 2½ miles of railroad track to carry their output to the Frisco railroad for shipment.

At present they are giving employment to 25 men; this will be increased to 40 when they reach their ultimate capacity. They now have a capacity around 40 cars per day. They expect to reach a maximum of 100 cars.

The Bloomfield pits are the largest producers of bank gravel in the state of Missouri.—*Bloomfield (Mo.) Vindicator.*

## Missouri Gravel Loading Station Burns Down

A GRAVEL loading station at the end of South Pine street, Carterville, Mo., owned by the Webb City Stone Co. and operated by the Highway Stone Co. of this city, was destroyed by fire recently. The loss is estimated at approximately $10,000, partly covered by insurance.

The Highway Stone Co. had leased the plant about three weeks ago and had begun operations; prior to that time it had been idle for several months.

A plant on the same location was destroyed by fire of incendiary origin about two years ago. W. F. Bailey, a former Missouri Pacific railroad agent, was sentenced to the state penitentiary on a charge of having burned the plant.

Owners of the station were unable to say whether or not they would rebuild.—*Joplin (Mo.) Globe.*

## Iowa Contractor Approves Weight Proportioning of Aggregate

IN a paper on "The Value of the Practice of Weighing Concrete Aggregate for Pavement Construction," read at the tenth annual convention of state highway officials, R. W. Crum, engineer, materials and tests, Iowa, showed the advantage of apportionment by weight instead of by volume. As typical of results where this plan had been in use he read a letter from a leading Iowa contractor who had just finished a large paving job, using this method, and who credited it with being more accurate, less expensive, quicker and from every standpoint greatly to be preferred to the volumetric system. Discussion on this paper emphasized the importance of moisture content determinations when the weight method is used, a common practice being to make at least six moisture tests daily so as to regulate the mix as desired. Another point was that in the volumetric method, compactness of sand had a decided effect on actual quantity. For example a high drop from hopper to measuring box will materially increase the weight of a given volume.—*Engineering News-Record.*

## Silica Sand in China

GLASS factories in Shanghai consider that the best Chinese sand which they have had occasion to test comes from Hongkung at a point called Pakshahu. Until very recently sand from this point was free. Now, however, private ownership of the district has been declared and a price of from $4 to $5, Hongkong currency ($2 to $2.50), is demanded per ton.

Other sources of supply now being worked are at Sutsien, Kiangsu province; Poshan, Shantung province, and Chinfangtao, Chihli province. That from Sutsien and Poshan is suitable only for the manufacture of ordinary window glass, table glass, bottles and similar articles not requiring high purity. A Japanese factory in Shanghai, the Poshan Glass Manufacturing Co., secures sand for its finer products in Japan. The demand for the finest sand is not urgent in China, as no optical glass, we believe, is yet being manufactured in this country.

An analysis of the sand from Pakshahu, Hongkong, shows the following to be its content:

| | |
|---|---|
| Silicia ($SiO_2$) | 99.50% |
| Alumina ($Al_2O_3$) | 00.25% |
| Iron Oxide ($Fe_2O_3$) | 00.05% |
| Non-Volatile and Residue with H. F. | 00.50% |

Most of the factories in Shanghai making bottles and other glassware buy sand through dealers who represent owners in the districts where it is secured. A Shanghai company formerly supplied sand from a deposit in Anhwei province to local manufacturers. The business, however, was not sufficient to warrant the company's devoting its time to it and this trade was dropped. An analysis of the Anhwei sand showed only 80% silica, and there was an iron oxide content of 1.9%.—*Chinese Economic Bulletin.*

## Import Glass Sand from Belgium to California

TWO ships at the Howard Terminal on the Oakland, Calif., Estuary recently were flying foreign flags. One was the big French freighter *Nevada.*

The *Nevada* brought in 800 tons of fine silver sand consigned to the Illinois Pacific Glass Co. This high grade of sand comes from Belgium and was loaded at Antwerp, being shipped directly to Oakland via the Panama Canal.—*Oakland (Calif.) Inquirer.*

## Missouri County Will Ask Royalty on Mississippi River Gravel

IT has been learned by the judges of the Lewis, Mo., county court that the bed of the Mississippi River from low water mark on the Missouri side to the middle of the stream belongs to the county. The great demand at present for sand and gravel has made the property valuable. A Moline Ill., company has sought to buy or lease the bed of the river adjacent to the Oyster land which contained the fine gravel bed bought by the Missouri state highway department. The court is considering a contract by which the county will receive a royalty on each ton of sand and gravel dug from the bed.

At the state gravel pit a second excavating outfit has been installed operating a two-yard bucket, to speed up the shipment of gravel in carload lots to contractors building state roads. Shipments now run 50 to 55 cars per day, the plants working 18 hours per day.—*Monticello (Mo.) Journal.*

## Vermont Milling Products Plant Burns

THE Vermont Milling Products plant at Fair Haven, Vt., owned by the R. J. Funkhouser Co., was totally destroyed by fire recently. The estimated loss is $500,000. The plant manufactures roof coverings from gravel, and it is said that a dust which collects in the mill is inflammable.

Mr. Funkhouser, who lives in Hagerstown, Md., was joined in Rochester, N. Y., by his brother.

The plant was a large one and covered a large area. It was bought several years ago by R. J. Funkhouser & Co. The loss is partly covered by insurance.—*Hagerstown (Md.) Mail.*

## Change in Ownership of Berkley Sand Company

H. P. BRIDGES has sold his interest in the Berkley Sand Co. of Berkley Springs, W. Va., to his former partner, Nelson Perin. The Berkley Sand Co. operates two of the largest and best equipped washing plants in the Berkley Springs silica district.

## Iowa Sand and Gravel Production

THE total production of sand and gravel sold in Iowa in 1923 was 3,597,160 tons. The value of the sand sold was $965,276 and that of the gravel was $1,216,605. There were 109 producers in the state and these were distributed over 29 counties.

## John J. Griffith to Be Secretary-Engineer of Indiana Sand and Gravel Association

THE Indiana Sand and Gravel Association, at its annual meeting held October 14, decided to employ a secretary-engineer to carry on the promotional and educational work which had been discontinued when R. C. Yeoman left the association to go with the Construction Materials Co. of Chicago.

The choice of the association has fallen on John J. Griffith, who is at present county engineer of Marion county, Indiana, the county in which Indianapolis is situated. Mr. Griffith is a registered engineer in Indiana and is a member of the American Association of Engineers. He has been president and is now secretary and treasurer of the state association of engineers. He has served eight years as county surveyor and engineer of Jay county, was four years engineer of Portland, Ind.; four years engineer of the Marion County Construction Co., and has been seven years in the position he now leaves to go with the association. Besides holding these positions Mr. Griffith has done a lot of consulting work in Indiana and Ohio.

With the election to the presidency of E. Guy Sutton, whose long connection with both the national and Indiana associations has made him thoroughly familiar with association needs and practices, and the choice of Mr. Griffith as engineer, the Indiana association should find itself in a strong position from which to carry on the educational and promotional work which was so important a feature of the association's activities in years past.

The matter is of interest to the entire sand and gravel industry as the work of the association was known throughout the industry and furnished an important example of what the proper activities of such an association might be. Such work has brought excellent results, not only in the increased sales of sand and gravel, but in better technical methods of preparing and sampling them and arranging for proper inspection. It has smoothed out the opportunities for friction with highway boards and added immensely to the sand and gravel resources of the state by its work for the acceptance of "tolerance" in certain sizes and in finding new uses for that part of the product which had formerly to be discarded.

Mr. Griffith will begin his work for the association on January 1.

## Portsmouth, Ohio, Sand and Gravel Company Makes Many Improvements

IMPROVEMENTS that will run into the thousands of dollars are being made by The Portsmouth Sand and Gravel Co. in rebuilding its plant at the foot of Third street in Portsmouth, Ohio. The entire plant from the pump boat to the truck and car loading equipment is being replaced with new in order to give the plant a daily capacity of 1500 tons of sand and gravel instead of the present capacity of 1000 tons. A new towboat and eight barges are to be built here. A new pump boat with a 10-in. "Amsco" pump was placed in operation last May, according to a local paper from which this account is taken in part.

Considerable headway has already been made on the work of rebuilding. Concrete piers have been built for the base of a new steel derrick and elevated track that will run from the hopper on the river's edge to the dump bins some distance back from the top of the river bank. The derrick with a 75 ft. boom will take the place of the derrick boat used in unloading sand and gravel from barges and is from the American Hoist and Derrick Co., St. Paul. It will have a 10x12-in. "American" 3-drum hoist.

Charles I. King, vice president of the company, is directing the work of rebuilding the plant. He has been in charge of boat and barge building and in addition will supervise the erection of the 15-ton stiffleg derrick, tramway and dumping and loading bins. The new tramway from the river's edge to the bins will be of heavier type of construction and will be built over the top of the present tramway and bins which means it will be considerably higher than the present structure. A new rotary screen will be another piece of machinery installed. The new bins are 60 ft. long, 12 ft. wide, and 47 ft. high. The new tramway is 350 ft. long and 35 ft. high, and will permit the storage of 25,000 yd.

Approximately 176,000 ft. of lumber is to be used in the rebuilding of the plant. The shipment includes several unusually large timbers, 12 by 12 timbers 70 ft. long and several 7 by 18 timbers 84 ft. long. Most of the timbers are more than 40 ft. in length. They are of Oregon fir from Seattle, Wash.

The new towboat, to be christened *"Mac,"* will be launched in December. The boat will use a 60-hp. Fairbanks-Morse oil engine. It is being built on the company's ways near Scioto. The company has two towboats, the *Pilot* and *Belle C. Edgington.*

The improvements are expected to be completed by February 1, 1925. Engineer George Wilhelm has been in charge of the preliminary work of locating the new machinery.

## New Texas Gravel Operation

A NEW gravel pit has been opened east of Ennis, Texas, near the former gravel pit operated by the Callahan Construction Co. Business men of Terrell and Ennis form the company, which is known as the Midland Sand and Gravel Co. The lease covers between 100 and 200 acres, on which the supply of gravel is said to be much larger than on the old pit, recently exhausted.

The Texas Midland R. R. has built a spur to the plant.

## Canadian Company Would Build Basin to Catch River Gravel

DENYING that the erection of a breakwater, to act as a gravel catch basin, would impair Sarnia's water supply, the Huron Sand and Gravel Co., Ltd., of Toronto, admitted its intention to build it.

The company, which has been supplying Detroit contractors with St. Clair gravel, also admitted that the erection of the basin will detract considerably from the regular flow of gravel to the customary gravel-beds.

Sarnia, Ont., has issued a formal protest against the scheme and is seeking an injunction to prevent the erection of the breakwater.

The company claims, however, that instead of being 600 ft. north of the Sarnia intake pipe, as reported, the breakwater will be 3000 ft. north, and the rapidity of the flow of current will remove any possible danger to the Sarnia water supply system.

The claim is made that this and other matters pertaining to the city of Sarnia were taken up with the federal department of marine and fisheries at the time when a lease was obtained on 3000 ft. of frontage on the Canadian side for purposes of gravel extraction.

The erection of a breakwater dock running 200 ft. out from shore has already commenced.—*Port Huron (Mich.) Times.*

## The Gravel Industry at Oxford, Michigan

THE gravel industry is putting Oxford, Mich., on the industrial map. There are five gravel pits being operated near the town. Glacial action is responsible for the deposits of gravel in this section of Oakland county, the nature of their origin being clearly discernible in the markings of the various strata along the sides of the pit. One of the pits is the oldest in Michigan, that of the Detroit and Oxford Gravel and Stone Co. Another operated by the Ward Sand and Gravel Co. is said to be the biggest single pit in the world, capable of loading more gravel in 24 hours than any other pit known. A third pit, that of the United Fuel and Supply Co. of Detroit, belongs to the biggest gravel concern in this part of the Middle West, a company which not only operates three big pits, but which owns a fleet of dredges at Detroit as well, which take up gravel from the rivers and lakes. Two others, the Fuller-Becker pit and the P. Koenig Coal Co. of Detroit, contribute a share to the 325 carloads of gravel a day which is Oxford's average output. This average daily shipment is worth, at prevailing prices, some $8000, the freight charges paid on gravel shipped from Oxford each year running more than $2,000,000. The five pits have annual payrolls totaling around a quarter of a million dollars, 200 men being employed all summer.—*Michigan Contractor and Builder.*

# Editorial Comment

ROCK PRODUCTS wishes a Merry Christmas to all its subscribers and readers, and in doing this it is glad to feel that it will indeed be a pleasant holiday season since it closes a year of merited prosperity in the rock products industries. If we had had any doubt of this the answers so generously returned in response to our annual questionnaires would have dispelled it. We thank those who reported and earnestly hope that those who did not might have recorded an equally prosperous year and the same optimistic outlook for the year to come.

**Merry Christmas**

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The Bureau of Mines has recognized the growing importance of mining in the recovery of limestone and gypsum rock and, as told elsewhere in this issue, has appointed J. R. Thoenen as a consulting engineer to prepare a report on the application of underground methods to the non-metallic mineral industries. It is intended that this report shall serve as a textbook to those operators who desire to turn from quarrying to mining but who do not know how to start or whether or not their conditions justify the change.

**Mining for Rock Products**

In doing this Mr. Thoenen is enlarging upon the work he has already done for ROCK PRODUCTS readers in preparing the series of articles that have been such an important feature in this magazine during the past six months. It pleases us to record that Mr. Thoenen's work has been given such an official recognition, and we believe that on account of this experience he will be able to make a more valuable report than otherwise.

ROCK PRODUCTS intends to pay considerable attention to mining in the coming year and already has in preparation some important articles on the subject, one of them by a well-known consulting mining engineer who has had much experience in the great "open cut mines" —really quarries—of the southwestern copper fields. There is no reason why the metallic and non-metallic mineral industries should remain in separate, watertight compartments. Both industries have lost by doing this, as this paper has often pointed out, because they did not exchange knowledge and take advantage of each other's experience. Mining is mining, even though you call it "underground quarrying," and quarrying is still quarrying although it has been termed by some mining engineers, "open pit mining by quarry methods."

An excellent—and most unusual—example of the importance of applying mining methods in the rock products industry is found in the description of the National Stone Co.'s operation in this issue. Mr. Sullivan, the manager of this operation, had more courage than many operators have displayed when confronted with ever-increasing costs on account of a heavy overburden, and it is pleasant to record here that his courage has been justified and rewarded.

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A well-known combustion engineer, who has taken particular interest in increasing the efficiency of lime manufacture describes on another page of this issue a lime plant which he has good reasons for believing is about as efficient as any in this country. This is a small lime plant—two kilns—as modern lime plants go, yet it doubtless is setting a pace for many larger competitors. It is the best evidence possible that effective and intelligent management is as good an investment as a lime manufacturer can make; and there can be no mechanical substitutes for it. This is of course true of all industries, but in the lime industry it seems to be undeniable that a large operation does not have any advantage over a small efficiently operated operation in point of production cost. The advantage of the larger operation is almost wholly in a more efficient and effective sales and distribution organization. In this particular case the sales and distribution are well taken care of by an organization with which lime is only one of several rock products manufactured and sold.

**An Efficient Lime Plant**

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An oil marketing association has recently calculated the cost of producing a barrel of oil at $2.17. As oil was selling at the time for $1.36 the report pointed out that the industry was not on a sound economic basis. One is tempted to point out certain differences between the oil and rock products industries, both of which are alike in that they take their raw materials from the earth and work up practically everything they take out into merchantable products. As compared, not only with oil but with many other basic industries, the rock products industries have shown a stability both in price and production that is perhaps unequaled in economic history. Production for the country as a whole has never so far exceeded demand as to cause great accumulations that had to be sold at a loss. It is largely a localized industry. The "spread" between production cost and selling price has always been moderate. While these industries have produced no Rockefellers or Fords they have well repaid initiative and the careful conduct of business. The failures have mostly been the sort of men who would have failed in any business. One of the reasons for the economic soundness of the rock products industries is that while money for oil ventures could always be had in floods from the public, the rock products man who wanted to buy a new steam shovel or build a plant addition had to earn the money from his operation.

**Oil and Rock Products**

## Michigan's State Cement Plant Claimed to Make Large Profits with Prison Labor

THE state operated cement plant at Chelsea, Mich., on the first of October of this year had netted the state a profit of $79,502.68 and in addition had paid $65,000 of the $75,000 rental for the year, according to figures made public by Henry Croll, Jr., state budget director.

According to Croll the plant made a profit of more than $33,000 during the month of September, the largest month since it was operated by the state, and it was expected that the output for October would exceed that of September. He estimated that when operations for the present year are over a net profit of more than $120,000 will be shown.

Since the plant was taken over by the state the first of the year, under an optional agreement to purchase with the annual rental of $75,000 a year to be applied on the purchase price, the plant has produced and sold 371,617 barrels of cement which cost the state $538,098 to produce and sold for $680,100. All of the cement sold went to state institutions and the highway department, and for other state purposes.

The plant has been operated entirely by prison labor, with only the supervisors free. The prisoners are paid on a basis of $1.25 per day plus a bonus based on the weekly production. During some weeks the prisoners are said to have earned more than $1.50 daily. All prisoners in the mill are those who have about completed their sentences and soon will be eligible for parole.—*Gladwin (Mich.) Record.*

[An analysis of the above figures shows that the Michigan state plant produced cement at a cost of $1.45 per bbl. and sold it at $1.83. A competing commercial plant would have to pay much more for labor as the wages would be nearer $4.25 per day than $1.25. Also it would have advertising and selling expense which the state plant does not have. Under these circumstances the Detroit price of $2.40 must be considered low. The point is: which is better for the state, to get cement at $1.83 and pay $1.25 wages to convicts or to pay $2.40 for cement and furnish work for skilled free labor who earn $4.00 and up a way—and are worth all they earn.—The Editors.]

## No More Cement Quotations by Bag

THE Universal Portland Cement Co., Chicago, Ill., announces:

"Effective December 1 we will quote, sell, and invoice our cement by the barrel and not by the sack.

"On June 1, 1923, we began handling our business on the basis of the sack instead of the barrel. This change was made after we had sent a questionnaire on the subject to our customers and the majority had expressed a preference for the sack.

"Since that time, however, we have found that many cement buyers, although purchasing from us by the sack, have continued, as for years past, to handle their own business on the barrel basis. Furthermore, we have received requests from many customers that our dealings with them be conducted by the barrel.

"It is because of what appears now to be the convenience of so many of our customers that we are making the change back to the barrel basis."

## New Egyptian Portland Cement Company Uses Pumps for Conveying Cement

IN the November 29 issue of ROCK PRODUCTS it was stated that belt conveyors and bucket elevators would carry the cement from the finish-grind mills to the new storage plant of the New Egyptian Portland Co. at Port Huron, Mich.

J. A. Acker, of the company, writes that this is incorrect and that Fuller-Kenyon pumps, made by the Fuller Engineering Co., Catassuqua, Penn., are used for conveying the cement to the storage plant.

This is interesting because it is the first use of these pumps for conveying cement which has been brought to the editors' notice, although it is familiar as a device for handling powdered coal. The Fuller-Kenyon pump is described in the November 17, 1923, issue of ROCK PRODUCTS in one of Richard K. Meade's articles on the nature, preparation and use of pulverized coal. It is an ingenious device for conveying finely pulverized material by the use of only a small amount of compressed air.

## Cement Company May Install Two Crushing Plants

THE Ash Grove Lime and Portland Cement Co. may install two large rock crushers in the vicinity of Ash Grove, Mo., according to information received from Ash Grove. It is stated that the company will put one crusher at the quarry north of Ash Grove, and the other at the old quarry southwest of the town. Both locations are equipped with standard gauge railroad tracks.—*Springfield (Mo.) Leader.*

## San Antonio Cement Company Builds New Slurry Tanks

Contracts for the 10 new concrete slurry tanks for the San Antonio Portland Cement Co. were let during the past week to a St. Louis contracting firm, for approximately $85,000. W. E. Simpson Co. is the engineer for the project.—*San Antonio (Tex.) Express.*

## Cement Company Threatened with Suit on Account of Dust

AT a town meeting of citizens of West York borough, Penn., held last evening at the Reliance engine house, a plan of procedure was evolved against the Sandusky Portland Cement Co., whose plant, situated west of the borough, is the cause of the cement dust which has been the contention of borough citizens for many years. Enthusiasm ran high at the meeting. Reports of the subscription workers were received and a resolution was drawn.

About 25 citizens attended the meeting. A preliminary injunction against the cement company will be filed in court as soon as enough evidence is secured.

A committee of five persons was appointed to act as leaders in securing evidence against the cement company. Several persons expressed their intention of suing the company for damages. Meetings of the committee will be held on numerous occasions and reports of the progress will be given. The intention of fighting the nuisance to the end was expressed unanimously. A representative of the Sandusky company was present at the meeting, but he did not make any statements in regard to the case.—*York (Penn.) Dispatch.*

## Contract Awarded for Linwood Cement Company's Plant

THE contract for the new plant of the Linwood Cement Co., to be erected at Linwood, Iowa, at an approximate cost of $2,000,000, has been awarded the Henry W. Horst Co., general contractors.

The work will be rushed through the winter, J. F. Schroeder, secretary and treasurer of the firm, states, so that production may be started by July 1 of next year.

The contractors have begun to pour concrete for the foundation and will place a large force at work so as to complete the plant as soon as possible.

Officers of the Linwood company have conferred with railroad officials and members of the state highway department on switch track and on the location of a new concrete highway through the property.—*Davenport (Iowa) Times.*

## British Columbia Cement Company Buys Another Motorship

ACCORDING to the head offices of the British Columbia Cement Co., Ltd., with headquarters at Victoria, B. C., that concern has recently purchased the motorship *Caria,* and has sold one of its other two ships, the *Matsqui,* to the Coast Steamship Co., of Vancouver. The new ship will be stationed at the company's plant at Bamberton and will work in conjunction with the *Teco,* also owned by the B. C. Cement Co.—*Victoria (B. C.) Times.*

## United States Gypsum Company Starts Another Lime Plant

OPERATION of a new lime plant at the United States Gypsum Co. factory in Oakfield, N. Y., was started December 1. Construction of this new unit of the largest gypsum-working estabilshment in the world was begun in June. It cost $125,000 and will produce more than 15,000 tons of lime a year.

Five vertical steel-jacketed kilns have been erected, and modern crushing, hydrating, grinding, screening, and packing machinery have been installed. The plant is of permanent steel and concrete construction.

Besides producing materials that will be used in the manufacture of other products, this unit adds two new commodities to the output of the Oakfield plant. One is a high-calcium pebble-lime which is a rapid-slaking substitute for lump lime. This is made from rock taken from the Onondaga formation which at this point is 99% pure carbonate of lime. The other product is mason's hydrate. It is possible to produce this in the same plant because under the high-calcium stratum there lies a vein 23 ft. thick of the famous Falkirk bed of high-quality dolomitic limestone.—*Rochester (N. Y.) Democrat and Chronicle.*

## Wall Plaster, Wall Board and Floor Composition

THE Department of Commerce announces that, according to reports for the biennial census of manufactures, 1923, the establishments engaged primarily in the manufacturing of wall plaster, wall board, and floor composition in that year reported products valued at $73,800,539, an increase of 46.9%, as compared with $50,226,758 in 1921, the last preceding census year. The value of the wall plaster produced was $37,825,147; of wall board, $20,627,408; of the floor composition, $3,455,906; and of all other products, such as putty, mortar, plaster lath, blocks, tile, etc. (and also probably including some wall plaster, wall board and floor composition not specifically reported as such), $11,892,078.

Of the 196 establishments reporting for 1923, 41 were located in New York, 26 in California, 15 in Ohio, 13 in Michigan, 10 in Pennsylvania, 9 each in Illinois and Iowa, 7 in New Jersey, and the remaining 66 in 27 other states producing gypsum.

The statistics for 1923 and 1921 are summarized in the following statement. The figures for 1923 are preliminary and subject to such correction as may be found necessary upon further examination of the returns.

| | 1923 | 1921 | Per cent of increase |
|---|---|---|---|
| Number of establishments | 196 | 167 | 17.4 |
| Wage earners (average number)* | 9,288 | 6,979 | 33.1 |
| Wages | $14,893,572 | $9,839,237 | 51.4 |
| Cost of materials (including fuel and containers) | $33,124,267 | $25,168,902 | 31.6 |
| Products, total value | $73,800,539 | $50,226,758 | 46.9 |
| Wall plaster | $37,825,147 | (†) | ..... |
| Wall board, including plaster-board | $20,627,408 | (†) | ..... |
| Floor composition | $ 3,455,906 | (†) | ..... |
| Other products‡ | $11,892,078 | (†) | ..... |
| Value added by manufacture§ | $40,676,272 | $25,057,856 | 62.3 |
| Horsepower | 63,210 | (‖) | ..... |
| Coal consumed (tons of 2,000 lb.) | 311,777 | (‖) | ..... |

*Not included salaried officers and employes nor proprietors and firm members. Statistics for these classes will be given in final report.
†Not reported separately.
‡Putty, mortar, plaster lath, blocks, tile, etc., and probably including some wall plaster, wall board, and floor composition not specifically reported as such.
§Value of products less cost of materials.
‖Not reported.

## Seattle Wall Board Plant Changes Hands

THE Seattle plant, property, and holdings of the Washington Building Products Co. has been transferred, by sale, to the Schumacher Wall Board Corporation of Los Angeles, according to an announcement made by an official of the Schumacher corporation.

In making this formal announcement, it was stated that the plant, formerly operated by the Washington Building Products Co., will continue manufacturing Washington wall board and in addition, shortly, Schumacher wall board, which is particularly well known in the southern California field, will be turned out.

It was also stated that in the immediate future an addition will be made to the existing plant, machinery installed and changes made materially increasing the factory's capacity.—*Seattle Post-Intelligencer.*

## Iowa's Place in the Gypsum Industry

IOWA has for years occupied a favorable place in the gypsum industry, being excelled in recent times by New York alone. During 1923 the output of gypsum and its products took a long stride ahead of that for 1922 as there were mined 685,000 tons as compared with 536,905 tons the year before. A large amount is sold crude for use in Portland cement to retard the set. Some is sold for agricultural purposes. The total sold crude in 1923 was valued at $385,283. Most of the gypsum mined, however, is prepared for use as wall plaster, plaster of paris wall board, partition tile and similar use. The total quantity of prepared (calcined) products was 431,829 tons, as compared with a similar output in 1922 of 326,937 tons. There are at present seven plants in operation, one at Centerville and six at Fort Dodge.—*Elkader (Iowa) Register.*

## The Days When Gypsum Fertilizer Was "Witchcraft"

"AM only going to trouble the readers with a few of the authorities I have in my possession, and will quote from Mr. Smith and Mr. Harris of Philadelphia, about 1800," says G. W. Hunt in a letter to the *Chilliwack (B. C.) Progress.*

"'In Germany, where this fossil has been longest known and used, opinions have been very opposite, and many of them very absurd and ridiculous. Witchcraft has been charged on those who used the plaster, on account of excessive crops, but some wonderfully wise people said it produced or attracted thunder and lightning. Petty princes made edicts against it, urged by the bigotry of its opponents and the unfounded German adage, 'That it makes rich fathers and poor children.'"

"'Peasants have, however, sown the plaster on their fields at night.

"'In this same Germany today, and before the war, Philip Metz thought sufficiently well of gypsum to use it in the barns to preserve manure, and also on potatoes and legumes of all kinds, and in this way increased Germany's production 32% in grain, 11% in cattle, and 32% in hog products, and did not break up more land. He also shows by his own experiments that every ton of manure preserved with gypsum is equal to four preserved in the ordinary way or without the use of gypsum. He also publishes the statement that every ton of gypsum used in your barn preserves $30 worth of nitrogen.'"

## Build Dwellings of "Structolite"

"STRUCTOLITE" is a new building material which has been developed by the United States Gypsum Co. It seems to be especially adapted to the rapid construction of dwellings, and the following description of its use is from the *New York Post:*

"Work is in progress on 11 houses in Yonkers, which represents a new type of home construction. They are among the first dwellings in the United States with all walls and partitions built of structolite, a new adaptation of gypsum.

"These two-story, six-room dwellings are part of a project of 22 being constructed by the Sanzo Metal Forms Construction Co. for the Treman Construction Co. Their foundations, of portland cement concrete, are finished and on them walls 8 in. thick and partitions 4 in. thick are being poured of structolite.

"These are the first bearing walls ever built of gypsum, although this mineral has been used for 25 years in floors, roofs and partitions of factories and skyscrapers. It was about three years ago that the United States Gypsum Co., at its plant at Oakfield, N. Y., devised chemical formulas for giving gypsum sufficient density to increase its bearing strength. This strength was proved recently by tests conducted at the engineering laboratories of Columbia university."

# Preparing for Big Convention of Slate Producers

SLATE and its uses will be considered in all phases at the annual slate industry conferences, held under the auspices of the National Slate Association at the Hotel Commodore, New York, on Monday and Tuesday, January 19 and 20. These conferences are not restricted to members of the National Slate Association, but include all engaged in the production, sale or installation of slate.

In addition there will be special group meetings of each branch of the industry, the Annual Slate Industry dinner, with its many entertaining features, and a complimentary luncheon tendered to the slate trade by manufacturers and distributors of their equipment and supplies.

Registration and greeting of members and their guests at 11 o'clock Monday morning, January 19, will be followed by a general luncheon of strictly informal character where George F. Barnard, of the Geo. A. Barnard Co., roofing contractors, of Worcester, Mass., and chief executive of the Monson Maine Slate Co., will voice a message of welcome in his capacity as president of the National Slate Association. Mr. Barnard's activities in both the production and contracting branches of the industry provide him with a wealth of experience and breadth of vision that make him an ideal president of an association which includes among its members those active in all branches of the slate industry.

Immediately following luncheon six or more group meetings of the various branches of the industry will convene, each providing a platform for a discussion of their own particular problems and interest, including

A—Roofing and milled slate producers.
B—Dealers and jobbers.
C—Crushed and ground slate producers.
D—Slate roofing contractors.
E—Slate setting contractors.
F—Roofing and milled slate salesmen.

At 4 o'clock, the electrical switchboard and panelboard manufacturers will join the group A conference for a discussion to correct misunderstandings, adjust complaints, arrive at some standardized basis of measurements, eliminate wastage and make a general clearance of the problems which have characterized conditions in the marketing of electrical slate.

The annual dinner at 6 o'clock on Monday will alone be worth the journey to New York, for, in addition to the gustatorial feast, a program of fun and frolic is in course of preparation that will long remain a fond memory with every slate man who is lucky enough to have his feet under the festive board. Not alone that, the announcement of awards for outstanding achievements in many branches of activity in the industry will provide many surprises and much mirth, to say nothing of the solid facts and ideas presented for the advancement of slate in all its varied phases. These awards will recognize the highest achievement in advertising, selling, displays at building shows, new uses and other features, too numerous to mention.

Of course, every guest will be presented with an appropriate souvenir and will have an opportunity to join the theater party that will provide a fitting end to a pleasing and profitable day.

Tuesday morning will be devoted to a resumption of the group sessions and the association annual business meeting, merging into a general assembly at 11:30 when recommendations by the different groups will be made to the association of their findings in separate session, and acted on, as to what can be done for each branch of the industry and the industry as a whole toward improving conditions. A novel feature of this meeting will be the first showing of the new "Slate Movie" planned and developed by the association.

At 1 o'clock the entire convention will be guests at the complimentary luncheon tendered the slate trade by the concerns from whom they purchase their equipment and supplies. The closing session of the convention immediately following will take up the question of how to improve methods of production and distribution. Discussion on this vital subject will be shared by both the concerns furnishing equipment and the practical slate men who use it; who will meet on a common ground and develop a common program of improvement for themselves and the industry at large.

A resume of a trip abroad to the quarries of England and France is promised as a feature of the discussion, giving comparisons of domestic and foreign methods of production.

## Let the Motor Trucks Alone

**(An Editorial in the Chicago Tribune)**

MOTOR transport worries the American Electric Railway Association. Presumably it does the steam roads, too. J. N. Shannahan, president of the former, wants motor vehicles placed under the supervision of the public utility commissions. He would subject motor trucks and busses to the rate and other regulations of commerce and interstate commerce commissions. He would thereby eliminate them as dangerous competitors of existing rail lines.

Mr. Shannahan's feelings in this matter may easily be appreciated. He sees heavy investments tied to tracks and a fixed right of way threatened by flexible guerrillas with a gas engine following the trade as a hound follows a rabbit. They can concentrate transport on the place and the time when business is good and they can retire or shift without great overhead and capital losses when business is poor. All this worries Mr. Shannahan.

But Mr. Shannahan forgets that the motor truck is as legitimate an intrusion into commerce as the railways were that displaced the steam packet boats. To "regulate" them into impotency at this time would be an artificial barrier against natural transport evolution. That is not good for business.

In 1922 there were 1500 motor express lines in the United States. There were 40,000 motor busses in use. Farm products hauled by motor transport amounted to 134,000,000 tons. Freight hauled by motor trucks amounted to 1,430,000,000 tons. Only 40 railroads were utilizing motor trucks in 1922 and those not to a great extent. Only 56 street railways were using them. Motor transport has justified itself economically. It is an asset and an auxiliary to the steam road system and should be considered as such. The railroads themselves should coordinate the two types of transportation.

If the railroads would devote the same energy to the development of auxiliary truck lines and feeders that they devote to getting artificial protection against legitimate competition they would be a healthier condition to meet the inevitable struggle of the coming era. They have been helped almost enough.

## A Good Example of Promotional Literature

"THROUGH the Ages" is a handsome and beautifully printed book advertising the architectural uses of marble, in which the extraordinary durability of marble as a building material is well brought out. It is published by the National Association of Marble Dealers and is an excellent example of the promotional and educational work that such trade organizations should carry on, inasmuch as such work benefits the industry as a whole.

## National Cement Company Producing in Temporary Structures

THE National Cement Co. has not completed the new buildings for its plant which was partially destroyed by fire at Ragland, Ala., two months ago, but with the use of temporary structures, is now producing 80,000 bbl. of cement a month. All of the output is being shipped. The company expects to complete the new plant early in the new year.—*Birmingham (Ala.) News.*

# Louisville Cement Company's Lime Plant One of the Most Efficient

## Milltown, Indiana, Kilns Are Gas Fired, Continuous Draw, and Have Remarkable Capacity, and Linings Have Remarkably Long Life

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THIS lime manufacturing plant is the most interesting the writer ever visited and he would not be surprised if it was the best plant in this country in point of efficiency. The plant is very economical in fuel consumption for several reasons. The output is remarkably high, labor requirements are low and life of the kiln between repairs is almost unbelievable.

### Kilns

There are two kilns, each about 70 ft. total height. The diameter of the kiln shell is 20 ft. The cooler is about 12 ft. deep. The effective height of the kiln is 56 ft. The upper 25 ft. of the shaft is round and 18½ feet in diameter. In the burning zone, the kiln is divided by a pier into two sections, each about 12 ft. by 5 ft., rounded on the ends. This pier extends for about 12 ft. up into the burning zone. At the bottom of the pier, there are four gas openings to the kiln, two being on each side. Two gas openings enter each zone from the outside, thus making four gas inlets to each zone or eight altogether per kiln. It was said that above the burning zone the wall of the kiln first draws out, then in, then out again into the storage zone opening. A partially accurate and partially inaccurate sketch of the kiln is shown herewith.

### Kiln Capacity

The average output of one kiln with two producers was said to be 63 tons per day. The kiln with one producer only gives about 54 tons of lime per day. This output is fairly certain and figures were shown the writer to substantiate the results claimed.

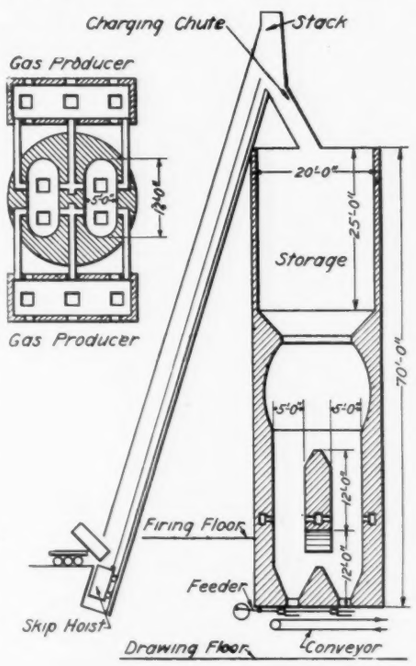
The two kilns are charged by means of a skip hoist as usually employed in blast furnace work, the hoist and mine car capacity being 2½ yd. of stone. Each day it takes 54 of these mine cars to fill both kilns. When the kilns are empty 254 boxes of stone are needed to fill them.

It was said that four days are required for stone to pass through the kiln. This length of time is rather great and indicates that the large capacity is due to the great cubical content of the kiln and the consequent great time factor and surface.

The kiln is drawn continously by means of adjustable stroke pushers that push lime off a plate on to the conveyor. There are four drawing openings to each kiln. The kiln does not stick. At times it arches over but not very often. At the draw gates, holes are provided through which a bar can be inserted if lime does not come out to be acted upon by the conveyor.

### Lime

The lime comes out of the kiln cold and can be handled with bare hands. All handling up to the picking table is by means of conveyors. Immediately before the picking table, the lime passes over a grizzly where all fines are separated and dropped into a waiting truck below that takes them to the hydrating plant which is located at a distance. The large lumps are inspected on the picking table by a man who also removes what poor looking lime or core there may be. The lime is taken from kilns to cars by belt conveyor; wheelbarrows are not used for anything but crushed lime loading.




**Approximate sketch of kiln only**

### Gas Producer

The gas producers are very large, their size corresponding with a combustion rate of about 6 lb. of coal per square foot per hour. There is no steam used to operate the producer, not even for the cleaning of the fire bed. The producer bases are ordinary grates.

The producer walls are surrounded by a water tank through which water circulates and after becoming heated flows to outlying tanks to be cooled. This arrangement, while expensive in first cost, assures long life for producer wall and their tightness to air in filtration.

The ashpit doors on producers are kept closed and a fan supplies the air. The purpose of this fan is not however, to create strong draft. It is merely to assure equal distribution of air to both producers which otherwise was impossible due to the effect the wind direction and intensity had.

The coal burned is Ayrshire, Indiana Washed No. 4 and the fuel bed thickness is about 4 ft. The amount of carbon noted in the ash is more than in a true producer installation but less than ordinarily found in hand fired installations.

The coal is not shoveled. It is elevated to coal bunkers, then discharged as required through spouts directly into the producer. The firing thus becomes a simple matter.

The producer is fired as required. There is no regular time interval.

### Preheated Air

All air for combustion enters at the bottom of the kiln and passes up through the lime cooler where it is preheated. The use of this principle is responsible for the lime coming out of the kiln cold. This principle also greatly increases kiln efficiency because heat that usually is wasted in the hot lime is retrieved. The air enters by natural draft and the pressure in the kiln is balanced. In no place was there any evidence of flame pushing out. A handkerchief test also indicated that there was little air entering except in the bottom. The air in the bottom was induced by the draft created by the height of the cooling zone.

### Kiln Life

Normal life of the kiln was stated to be more than three years. At one time, the kiln was in continuous operation for over six years. To make this possible, no special

*Lime plant at Milltown, Ind., of the Louisville Cement Co., reputed to be about the most efficient shaft-kiln lime pla*

*In lime plant in the United States—Mining operations are carried on to the right, beyond the edge of the picture*

refractory is used. When looking into the kiln, it was noted that temperatures are low against the wall and much higher in the middle of the kiln, this condition being the reverse of what ordinarily is found to be the case with other kilns. The reason is probably that air is induced up through the cooler and it meets the gas in the middle of the kiln zone rather than as ordinarily is the case when induced mixed with the gas.

Using the principle of inducing air through the cooler did not seem to have a harmful effect upon lime appearance; in fact, it may have a bleaching effect.

### *Kiln Fuel Efficiency*

The fuel ratio is stated to be better than four tons of lime per ton of coal; considering the coal, this is very good, especially since it is net 4 to 1, none to be deducted for steam used around the kiln which cuts the ratio down considerably in many otherwise fairly efficient installations. There is no smoke in the top of the kiln; only a trace at times, which is as it should be. There is a probability that at times too much air is used so that certainly the loss due to incomplete combustion is insignificant in spite of the bottom air.

### *Conclusions*

The bottom induced air was tried in many plants, with poor results, and the fact that in this plant it works satisfactorily is very interesting and very important since at least 10% of the fuel can be saved by this principle and in addition kiln life lengthened.

The great output is interesting even if it is entirely due to the large kiln dimensions. It appears even that the output should be greater than it is if we compare the output with that of some other kilns on lime per cubical content basis.

The main advantage in large kilns is evidently in reduction of first cost, lower maintenance cost and lower labor cost. The cubical content of the kiln increases very rapidly as the diameter increases.

The labor costs in this plant are bound to be low in spite of the eight-hour shift. There are about three men per kiln per shift, not considering charging the kiln or putting up lime but including firing, cleaning the fires, drawing the lime and punching the kiln if necessary; consequently, this portion of the labor amounts to only one man for each seven tons of lime. The other labor around is, however, also low, due to automatic handling of coal, to automatic separation of fines from the lime, to the fact that lime does not have to be picked up from the floor and also due to infrequent repairs necessary.

J. Harry Lemmon is superintendent.

## Selling on Quality

A GOOD example of selling argument based on *quality* is Letter No. 6 of a series issued by the New Jersey Quarry Co., Morristown, N. J., and signed by I. W. Wortman, secretary. While the theme here is trap rock, the reader will readily see that the same line of argument will hold when selling washed sand and gravel in competition with side-of-the-road material, and in any situation where the producer can assign definite virtues to his material, and thus justify his higher selling price.

The letter reads as follows:

"Trap rock, from the standpoint of cost of production, cannot compete on an equal basis with gravel, limestone, dolomite or slag. To begin with trap rock crushes on the average at 42,300 lb. pressure to the square inch. This requires excess power and machinery to reduce trap rock to a marketable size. The wear on the machinery is greater and therefore must be replaced oftener than that preparing other concrete aggregates. The qualities which make trap rock superior are the qualities which make it wear out the machinery, namely hardness and toughness.

"Take the other aggregates; limestone and dolomite average a crushing strength around 22,000 lb. Most of the gravel in New Jersey is never crushed at all, as it is very small. Slag, of course, is a waste material and usually not subject to the expense of drilling and blasting.

"It is only natural that if the better material is not specified by the engineer, the contractor will buy the cheapest material passing the specifications. It has resulted in various states that the gravel price is just under the trap rock price when in competition. Hence, why not specify trap rock on road work and use same exclusively where the cost is not very much greater than that of other material?

"New Jersey engineers, by allowing all sorts of materials for coarse aggregate in concrete and maintenance, curtail the market for trap rock and thus increase the cost of its production. For the market for concrete aggregates is a fixed market. You cannot go out and create a demand as you can in the automobile or tobacco business. And, therefore, when engineers substitute another aggregate for trap rock, production is decreased and costs increased.

"The difference in cost of trap rock at points where it competes with other materials which are on lower freight rates is negligible and is such a small portion of the total cost of the work that it would seem advisable to invest that additional cost on account of the more enduring quality of the work that would result."

## Oxy-Chloride Cement Manufacturers Association in Enlarged Field

THE National Association of Oxy-Chloride Cement Manufacturers, formerly the National Association of Composition Flooring Manufacturers, has undertaken a country-wide campaign for increased membership. The campaign is under the direction of the directors of the association, Messrs. Wm. Baumbach, president of the association, American Monolith Co.; H. S. Weber, vice-president of the association, the Rocbond Co.; R. W. Page, secretary-treasurer of the association, Marbleoid Co.; H. E. Williams, Williams-Wendt Co.; G. W. Selby, Marine Decking and Supply Co.

The campaign for increased membership is based upon a definite program of activity that has been adopted by the association, some phases of which are already in effect. The program provides for work along such lines as the development of standards of practice, arbitration and adjustment of differences within the industry, an aggressive widening of markets and scientific research.

Important work has already been done in the development of standards of manufacture and installation for oxy-chloride flooring and stucco, the two chief products of oxy-chloride manufacturers.

Much of the work toward the development of standards of quality has been carried on in co-operation with the Bureau of Standards in Washington. An increase in the number both of regular and associate members is being sought and with initial success, according to a statement by the association. Initiation fees have been suspended for a short period in order to stimulate the increase at this time.

The association has been in existence, although on a less active scale, for eight years and has done much quietly effective work for its members and the trade served by them. The organization has established executive headquarters at 1328 Broadway, New York City, in charge of a salaried staff.

## Effect of Phosphate on Poor Lands in Ohio

ACCORDING to the Findlay, Ohio, *Republican*, 14 farms of the Ohio Experiment station, in different parts of the state, have shown that the highest profits from the use of acid phosphate have come from its use on poor lands. The report says:

"On one tract of land at Wooster, where the crops on untreated plots have had an annual value of only $14.80, acid phosphate alone increased the value to $19.70; a complete fertilizer to $28.10; and manure and acid phosphate to $36 per acre. On better land on which the untreated crops had a value of $32.20, acid phosphate alone increased the yield to $37.20; a complete fertilizer to $39.30; and manure and acid phosphate to $37.20.

"Of the 14 farms, the Clermont farm has given the lowest untreated yields, $11.70 per acre. On this farm acid phosphate increased the yield to $15.80, a complete fertilizer to $22.10, and manure and acid phosphate to $27."

## J. R. Thoenen to Make Study of Limestone Mining for the Bureau of Mines

J. R. THOENEN, whose series, "Mining and Quarrying Compared by an Engineer Familiar With Both Operations," has appeared in ROCK PRODUCTS during the past six months, has been appointed consulting engineer on the staff of the nonmetallic minerals station of the Bureau of Mines to make a detailed study of limestone mining. He will prepare a report which will cover the subject in detail.

It is recognized by the Bureau of Mines that a number of exposures of high grade limestone are worked out, that overburden is becoming heavier and that there are desirable beds that dip below waste rock. These conditions are more and more compelling operators to obtain their stone by underground methods.

Quarrymen in general are not familiar with underground work and the report which Mr. Thoenen will prepare is designed to be a text book on limestone mining, which may be placed in the hands of every superintendent to guide him in working out the safest and most efficient method of obtaining limestone from underground workings.

The choice of Mr. Thoenen for this work by the Bureau of Mines is a good one, for probably there is no one better qualified to undertake the work. He has not only operated limestone mines but has opened and developed deposits for mining and in preparing the series for ROCK PRODUCTS he has visited and studied the most important limestone mines of the country, and the companies operating them have given him every facility for making an intensive study of the methods employed.

## Costs at County Quarry Which Uses Prison Labor

PRODUCTION of stone at the Jamesville, N. Y., quarries reached 79,300 tons in 1923 and 30,800 tons in 1922, according to Raymond B. Traver, county superintendent of highways.

The cost of production has been decreased from 63 cents a ton last year to approximately 60 cents this year. The county sells stone at 80 cents a ton to other counties and gets 50 cents a ton for the dust.

The superintendent explained that these costs are the same as charged against each road the county builds, though technically the charging is merely a matter of bookkeeping, or taking money from one pocket and putting it in another.

This year the highway department sold 20,160 tons of stone and 822 tons of dust to other counties, which brought a revenue of $16,539.35.

According to the figures, the apparent margin of profit is about 20 cents a ton, which, according to the superintendent, would be more than enough to pay for the labor of penitentiary inmates who work in the quarries. At present the penitentiary is not given credit for the labor of convicts and the value of their labor is not figured in the cost of production.—*Syracuse (N. Y.) Journal.*

## New Stone Crushing Plant to Be Built in Springfield, Mo.

A COMPANY, composed of a number of local business men, has purchased a tract of land east of Doling Park in Springfield, Mo., and will begin the construction of a modern crushing plant, it was announced by Fred Garrett, a member of the company.

The company, which is being organized with a capital of $100,000, is composed of the following Springfield business men: Fred Garrett, C. O. Sperry, N. N. Ferguson, Tom Watkins, James Billings, Hollis Wright, Dr. S. F. Freeman, Lewis Luster, Ed Stigall, and others.

Work of constructing the plant will begin in the near future. The plans of the company are to construct one of the most modern crushing plants in the southwest. The equipment will include a gyratory crusher and this plant will be operated with a 100 hp. oil burning engine. The mill will have an expected capacity of 500 cu. yd. a day.

The quarry property is composed of 12 acres upon which the supply of rock is unlimited, as there have been holes drilled in the formation for 196 feet without striking water. The rock is of high grade limestone and has passed the state specifications for road work. It is the intention of the company at a later date to go into general construction work.

The output of the mill will be delivered to the consumers by trucks which the company is now purchasing. The company expects to dispose of its products to all parts of southern Missouri.—*Springfield (Mo.) Leader.*

## Steamer Grounds Loaded with 10,000 Tons of Crushed Stone

THE big steel steamer *Bradley,* loaded with 10,000 tons of crushed stone, grounded at the entrance to Menominee harbor recently, due to the low stage of water.

The tug *Leathem D. Smith,* Capt. Wm. Boyd, was sent from this port to the aid of the stranded vessel, arriving on the scene about 11 o'clock. After jettisoning part of the cargo with the self-unloader, Capt. Boyd succeeded in pulling the *Bradley* off the bottom.—*Sturgeon Bay (Wis.) News.*

## Well-Known Colorado Gold Mines Turn Gold Ore into Crushed Stone

PRODUCTION from the Vindicator and Golden Cycle properties of the United Gold Mines Co. continues at about 100 cars of ore per month and from 100 to 150 carloads of crushed rock. Reports that there is any probability of the two properties closing down are emphatically denied by the management of the mines, and it is said their present production will continue at least for several months to come.

The Vindicator and Theresa shafts produced a total of 33 carloads in the first 12 days of November, which is at the rate of more than 100 cars a month, inasmuch as the heaviest shipments always are made the latter part of each month.

The rock crushing plants produced a total of 115 cars in October and, based upon the average of the first 12 days of this month, the tonnage will equal or exceed that amount in November. Screenings from the crushing plants are being shipped to the Golden Cycle mill and are selling from $3 to $10 a ton, returning some profit to the company in addition to the sales of the crushed materials to road paving contractors.

Two drifting machines are being kept steadily on development work in the Vindicator and are now driving on promising veins in virgin territory.—*Colorado Springs (Colo.) Telegram.*

## Crushing Plant Being Built to Crush Marble Quarry Refuse

A ROCK crushing plant to be used in the production of road material is to be built at Phenix, Mo., by the Missouri Crushed Stone Products Co. of Joplin.

The plant will have a capacity of eight cars a day of crushed rock.

It is intended to crush the refuse rock which becomes broken in being handled at the sawing plant of the Phenix Marble Co. together with broken stone at the big quarries. The material is to be used on roads in the Springfield district.

Building of the plant is already under way. It will be one of a chain of such ventures established by the company in different parts of the state.—*Ash Grove (Mo.) Commonwealth.*

## Prospecting Marble Quarries in Arizona

NATHAN BERTRAND, the diamond drilling contractor, has shipped one of his outfits to the marble quarries in the vicinity of Dragoon, Ariz., where he will put down a number of drill holes to determine the depth of the marble deposits.

Eastern parties have taken a bond on all the marble claims in that vicinity and will make a thorough examination of them, according to Arizona local papers.

# Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert, Munsey Building, Washington, D. C.

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning December 8:

### Western Trunk Line Docket

4264. Sand and gravel. Carloads, from Sioux Falls, S. D., to a few points representative of the situation. The present and proposed rates are as follows (rates in cents per 100 lb.):

| To— | Present | Proposed |
|---|---|---|
| Manley, Minn. | 4 | 3.5 |
| Rock Rapids, Iowa | 5.5 | 3.5 |
| Luverne, Minn. | 5 | 3.5 |
| Miloma, Minn. | 8 | 5 |
| Heron Lake, Minn. | 8.5 | 5.5 |
| Pipestone, Minn. | 10.5 | 7 |
| Butterfield, Minn. | 10 | 6.5 |
| Sibley, Iowa | 5.5 | 5 |

Minimum weight, 90% of marked capacity of car; except that when weight of shipment when loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply. In no case will the minimum weight be less than 40,000 lb. (By shipper.)

2957B. Sand and gravel. Carloads, from Muscatine, Iowa, to points in Minnesota, South Dakota, Missouri, Nebraska, Kansas and Colorado. Present: The following instances of the present adjustment Muscatine vs. Ottawa to representative points are shown:

From Ottawa, Ill.

| To— | Sand | Gravel |
|---|---|---|
| St. Paul, Minn. | 12 | 12 |
| Sioux Falls, S. D. | 25 | 25 |
| Omaha, Neb. | 15½ | 15½ |
| Kansas City, Mo. | 15½ | 15½ |
| Lincoln, Neb. | 24½ | 24½ |
| Hutchinson, Kan. | 33 | 33 |
| Wichita, Kan. | 24 | 33 |
| Denver, Colo. | 34½ | 61 |

From Muscatine, Iowa.

| To— | Sand | Gravel |
|---|---|---|
| St. Paul, Minn. | 12 | 12 |
| Sioux Falls, S. D. | 23 | 23 |
| Omaha, Neb. | 11 | 11 |
| Kansas City, Mo. | 11 | 11 |
| Lincoln, Neb. | 21 | 21 |
| Hutchinson, Kan. | 29½ | 29½ |
| Wichita, Kan. | 29½ | 29½ |
| Denver, Colo. | 38 | 55 |

Proposed: To readjust the rates in relation with rates from Ottawa, Ill. Minimum weight, 90% of marked capacity of car, but not less than 40,000 lb.

### Trunk Line Association Docket

507M. It is proposed that interstate rates on sand, carloads, from points in New York state on New England lines, which were revised March 15, 1923, be reinstated, effective February 16, 1925, to basis in effect prior to March 15, 1923. File 225-I.

### Southwestern Freight Bureau Docket

3043. Cement. To provide a suitable intermediate clause which will have the effect of applying the next more distant published rate to an unnamed intermediate point on cement, natural or portland (building cement), in bulk or in packages, as provided for carload shipments in Western Classification. Minimum weight 50,000 lb.; except when for carriers' convenience a car of less capacity is furnished the minimum weight will be the marked capacity of car, but not less than 40,000 lb., from Kansas City, Mo., and Kansas producing points; also Dewey, Okla., and Hy-Tex, Mo., to Memphis, Tenn., Helena, Ark., Vicksburg and Natchez, Miss., New Orleans, La., and points taking same rates. It is stated that what is desired is to provide rates from intermediate points, thereby eliminating Fourth Section violations which now exist.

3103. Crushed stone. To establish a rate of 4½ cents per 100 lb. on crushed stone, carloads, as described in Item No. 750 of S. W. L. Trf. No. 114A, from Mercer, Ark., to Seligman, Mo. Producers at Mercer, Ark., state they must meet competition of points outside of the 9702 territory, and further state the above rate is necessary in order to move the traffic.

3148. Cement. To establish rates on cement, hydraulic, natural or portland, in straight or mixed carloads, minimum weight as per S. W. L. Tariff No. 90E, from Mason City, Iowa, to points in Arkansas, Louisiana, etc., as shown in the tariff referred to, by amending Item No. 1060E to include Mason City, Iowa, as an origin point with an arbitrary to East St. Louis, Ill., of 15 cents per 100 lb., and to Kansas City, Mo., of 13½ cents per 100 lb. At present combination rates are applicable, and shippers request the publication of specific through rates from Mankato, Minn.

### Southern Freight Association Docket

17428. Cement. Carloads, from Spocari, Ala., to Alabama Great Southern R. R. stations, York, Ala., to Meridian, Miss. Present rates are based on either York, Ala., or Meridian, Miss., combination. Proposed rate, same as in effect to Meridian, Miss., viz.: 9 cents per 100 lb.

17435. Sand and gravel. Carloads, from Montgomery, Ala., to Nashville, Tenn. Present rate, $2.30 per net ton. (Combination.) Proposed, $2.10 per net ton, made with relation to rates in effect from and to other points on the L. and N. R. R.

17443. Sand and gravel. It is proposed to revise present commodity rates on sand and gravel, carloads, from Birmingham, Ala., and Group to S. A. L. Ry. stations in Georgia between Atlanta, Ga., and Birmingham, Ala., and on the Cartersville Branch to be no higher than the mileage scale published in its I. C. C. No. A6907. The proposed revision represents reductions.

17449. Stone, crushed, etc. Carloads, minimum weight. It is proposed to amend the description on stone, crushed, stone, rubble, stone screenings, slag, chert, sand and gravel (washed or unwashed), carloads, minimum weight marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern. Applicable between So. Ry. stations and between Southern Ry. stations and stations on connecting lines, as published in So. Ry. I. C. C. A9861 (Interstate mileage scale on sand, gravel and crushed stone) to read: "Stone, crushed, stone, rubble, stone screenings, slag, chert, sand and gravel (washed or unwashed), carload minimum weight 90% of marked capacity of car; except when cars are loaded to their visible capacity, actual weight will govern."

17451. Cement. Carloads, from Fordwick, Va., to Bunyon, N. C. Present rate, 20½ cents; proposed, 18½ cents per 100 lb., which is the rate proposed in the general cement revision.

17466. Slag and chert. Carloads, minimum weight 90% of marked capacity of car; except where cars are loaded to their visible capacity, actual weight will govern, from Birmingham, Ala., and Group to G. M. and N. R. R. stations between Meridian, Miss., and Louisville, Miss. Combination rates now apply. Proposed, $1.69 per net ton, same as rate in effect to Louisville, Miss.

17548. Crushed stone. Carloads, minimum weight 90% of marked capacity of car, from Samlaw, S. C., to Jacksonville, Fla. (proper and when for beyond). Present rate, combination. Proposed, $1.70 per net ton, made 35 cents per net ton higher than current rate from Columbia, S. C.

17549. Limestone, ground or pulverized. Carloads, minimum weight 60,000 lb.; stone, crushed or rubble, carloads, minimum weight marked capacity of car, from Ladds, Ga., to A. C. L. R. R. stations and N. W. R. R. of South Carolina stations. In lieu of present combination rates it is proposed to establish the following rates: To A. C. L. R. R. stations, viz., Lynchburg, Privateer, Broadway and Pinewood, S. C. $2.37; to N. W. R. R. of South Carolina stations, Packville, Stones and Tindall, S. C., $2.37; to Bordens and Rembert, S. C., $2.48 per net ton; made same as rates from Mascot, Tenn.

17583. Slag. It is proposed to cancel present commodity rates on slag, carloads, from Alabama City, Attalla, Gadsden, Anniston, Ala. (and groups), to Atlantic Coast Line common and local stations in Georgia and Florida, as published in Agt. Glenn's Anniston Group Tariff I. C. C. A374, account of no movement.

### Illinois Freight Association Docket

2596A. Slag, crushed or not crushed. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight, but not less than 60,000 lb., from Chicago, Ill., to Aurora, Ill. Present, $1.13 per net ton; proposed, $1 per net ton.

2884. Slag, refuse. Carloads, minimum weight 40,000 lb., from Federal to East Alton, Ill. Present, Classification basis; proposed, 50 cents per net ton.

2887. Stone, crushed. Carloads, minimum weight marked capacity of car, from Lehigh and Kankakee, Ill., to Dahlgren and McLeansboro, Ill. Proposed, $1.55; from Thornton, Ill., to same destinations, proposed, $1.68 per net ton; present, Class E.

2890. Sand, molding. Carloads, minimum weight as published in Pennsylvania Tariff I. C. C. F1642. From Greenville, Mulberry Grove, Lutz Spur, Vandalia and Bluff City, Ill., to Burlington, Davenport, Iowa, Moline and Rock Island, Ill. Present, Class E; proposed, $2.02 per net ton.

2891. Sand and gravel. Carloads, from Peoria, Ill., to Monmouth, Ill. Present, 88 cents per net ton; proposed, 80 cents per net ton.

2892. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity, actual weight, from Yorkville, Ill., to Knoxville, Ill. Present, $1.26 per net ton; proposed, $1.13 per net ton.

2905. Rock or stone, lime, broken or crushed. Carloads, minimum weight 80,000 lb., from Mosher and St. Genevieve, Mo., to Peoria, Ill. Present, $2.43 per net ton; proposed, $2.10 per net ton.

2909. To amend Illinois Class Tariff 256B and exceptions to classifications as provided in W. T. L. Rule Circular 1R to provide for exception for account of the C. & E. I. Ry., viz.: "Rates named in tariff, as amended, from, to or via stations on the C. & E. I. Ry. will not apply on grain, gravel, sand or crushed stone, nor on clay products as described in C. & E. I. Ry. Freight Tariff, 400A, I. C. C. 154, I. R. C. 66, Ill. C. C. 125, supplements thereto or reissues thereof. Combination of local rates, except where commodity rates are published, will apply."

2913. Sand and gravel. Carloads, to establish commodity rates on, minimum weight 90% of marked capacity of car, but not less than 50,000 lb., from Muscatine to various destinations in Illinois, e. g.:

| To— | Present | Proposed |
|---|---|---|
| Henry | $1.13 | $ .98 |
| Princeville | 1.13 | .98 |
| Green River | .88 | .86 |
| Eureka | ..... | 1.36 |
| Streator | ..... | 1.23 |
| Jacksonville | ..... | 1.36 |
| Joy | ..... | 1.23 |
| Cuba | ..... | 1.23 |

2915. Sand, gravel and crushed stone. Carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity of car, actual weight, but not less than 50,000 lb., from Joliet and Chillicothe, Ill., to Urbana, Ill. Present, Classification basis; proposed, $1.18 per net ton.

2787A. Sand, gravel, and sand and gravel pit strippings. Carloads, minimum weight 90% of marked capacity of car; except when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, actual weight will apply, but in no case shall the minimum weight be less than 40,000 lb., from Koss Spur, Iowa, to East Dubuque, Ill. Present, $1.06 per net ton; proposed, 90 cents per net ton.

2921. Sand and gravel. Carloads, minimum weight marked capacity of car; except when loaded to full cubical or visible capacity, actual weight, but not less than 40,000 lb., from Chester, Ill., to Henry and Carbondale, Ill. Present, Combination; proposed, 98 cents per net ton.

2922. Slag (smelter). Carloads, minimum weight marked capacity of car, from Aurora, Ill., to Illinois points, viz. (in cents per net ton):

| To— | Present |
|---|---|
| Batavia | 50½ |
| Downers Grove | 63 |
| Hinsdale | 63 |
| La Grange | 63 |
| De Pue | 101 |
| La Salle | 101 |
| Mendota | 101 |
| Naperville | 50½ |
| Ottawa | 88 |
| Peoria | 139 |
| Princeton | 113 |
| Streator | 88 |

Proposed, Classification basis; account commodity rate obsolete.

2924. Sand and gravel. Carloads, from Peoria, Ill., to Marblehead, Bluff Hall, Fall Creek, Seehorn, Hulls, Shinn, New Orleans, Brewster, Hortons and Rockport, Ill. Present, Class E; proposed, $1.26 per net ton.

906A. Sand and gravel. Carloads, minimum weight marked capacity of car, to Rinard, Cisne, Gaff and Fairfield, Ill., from—

| | Present | Proposed |
|---|---|---|
| Lincoln, Ill. | $1.26* | $1.13* |
| Palestine, Ill. | 1.26* | 1.13* |
| Pekin, Ill. | 1.39* | 1.26* |

*In cents per net ton.

**Central Freight Association Docket**

9688. Sand and gravel. Massillon, Ohio, to Ohio. Present, $1.40 to Newport, Stillwater and Piedmont, Ohio; 80 cents to Dover, and 90 cents per net ton to New Philadelphia and Uhrichsville, Ohio, 4690. Proposed, 90 cents to Newport, $1 to Stillwater and Piedmont, 70 cents to Dover and 80 cents per net ton to New Philadelphia and Uhrichsville, Ohio.

9697. Crushed stone. White Sulphur, Ohio, to Dipple, Arnold, Dublin and Amlin, Ohio. Present, 80 cents per net ton; proposed, 70 cents per net ton.

9712. Sand and gravel. New Cumberland, Ohio, to Painesville and Willoughby, Ohio. Present, $1.40 per net ton; proposed, $1.20 per net ton.

9744. Sand. Sandusky, Ohio, to Fremont, Ohio. Present, 80 cents per net ton; proposed, 70 cents per net ton.

9746. Sand and gravel. Urbana, Ohio, to Lockbourne, Ohio. Present, 13½ cents; proposed, 90 cents per net ton.

9758. Crushed stone, stone screenings and agricultural limestone (not ground or pulverized), in bulk, Milltown, Ind., to Rinard, Cisne and Gaff, Ill. Present, 20½ cents; proposed, $1.26 per net ton.

9760. Sand and gravel. Mechanicsburg Gravel Pit, Ohio, to Loraln, Ohio. Present, 18 cents; proposed, 90 cents per net ton.

## Sand-Lime Brick in Canada

THE use of sand-lime brick has greatly increased in Toronto in recent years. Hinds Bros., Northlands avenue, are now operating and have a production of 22,000 per day. Toronto Brick Co. has two plants with a capacity of from 80,000 to 100,000 brick per day. It operates its own lime plant. The York Sandstone Co. have a daily capacity of 50,000. The Harbor Brick Co.'s ordinary plant capacity is 20,000, but it is running night and day, producing 40,000 per 24 hours. This company is now installing new equipment which will give it a daily production of 40,000 without night work. The Coledon Brick Co. has a daily capacity of 60,000 and the Ajax, which is a new company, has just installed machinery with a capacity of 12,000 brick per day. R. Kennedy's plant has a daily capacity of 22,000; Don Valley Brick Works, 22,000; Wilcox Lake Brick Co., 20,000, and Leaside Brick and Sand Co. will have, when erected 44,000. This will give a total daily capacity of the sand-lime brick plants around Toronto of 372,000. This does not include the output of cement blocks, of which are manufactured in large quantities in Toronto.

## Vermont at Last Sold on Concrete Roads

UNDER the heading, "Debunk the Gravel," the *Burlington (Vt.) News* says editorially:

"Our gravel roads are making their last bid for favor before the fall rains and winter snows put them out of commission. A gravel road is good while it is good; but the periods of goodness are few and far between. All the calcium, oil and resurfacing cannot make them the year-round usable roads we must have. All Bate's horses and all Bate's men cannot put them together again.

"The small stretches of cement surfaces, built by our municipalities within their precincts and by federal aid just without those precincts, will contrast the stubborn policy of our state board with the vision of the hard surface builders. There is no blindness so great as that of one who will not see. Our state government has refused to see cement. It continues to shut its eyes to the final economy of hard surfaces and the possibility of year round use.

"This is a day when the American government is searching ways and means to bring the produce of the farms into a closer and better market. Surely no greater aid can be rendered the farmer than to provide him with trunk highways, which will permit him to transport his produce to markets, made nearer by swiftly traveled cement highways, and to centers which he can reach the year round. The pittance the farmer gets from labor upon the gravel roads is no comparison to the benefits which would come to him, if he could be assured of transportation, winter, spring, summer and fall."

## Accident Record of the Quarry Industry in 1923

OPERATION of the stone quarries of the nation required the services of 92,455 men in 1923, a larger number than has been employed in this industry since 1915, states the Department of the Interor in a review of statistics compiled by the Bureau of Mines. A total of 25,545,859 shifts were worked, constituting an average of 276 work days per man. Accidents during the year killed 143 men and injured 14,990, indicating a fatality rate of 1.68 and an injury rate of 176 per thousand full-time, 300-day workers. The corresponding rates for 1922 were 1.92 killed and 172 injured; for the five-year period 1916-1920 similar rates were 2.10 killed and 160 injured.

The volume of work performed, or the aggregate number of man-shifts worked by all employes in 1923, has not been equaled in the stone quarrying industry since 1913, the Bureau of Mines statistics show. The average number of work days per man was the highest ever reported. The fatality rate from accidents at the quarries was the lowest on record. The nonfatal-injury rate was slightly higher than that for recent years.

In the number of man shifts worked, all branches of the quarry industry experienced a better year in 1923 than in 1922. As compared with 1922, lower fatality rates were indicated for quarries producing slate, granite, cement rock and sandstone. The rates for limestone quarries and for traprock quarries were the same as in 1922, while the fatality rate for marble quarries, though lower than for most other kinds of quarries, was yet slightly higher than in 1922. The nonfatal-injury rates were lower for quarries producing limestone and traprock and higher for quarries producing cement rock, granite, sandstone and slate. The rate for marble quarries remained unchanged.

Men employed within the quarry pits numbered 57,188; they averaged 263 work days per man during the year and performed a total of 15,067,691 days of work. Accidents to these men resulted in 99 deaths and 8946 injuries, indicating a fatality rate of 1.97 and an injury rate of 178 per thousand full-time workers. Employes at crushers and other plants outside the quarries numbered 35,267; these men worked 10,478,168 shifts, an average of 297 work days per man. Accidents to these workers caused 44 deaths and 6044 injuries, representing a fatality rate of 1.26 and an injury rate of 173 per thousand full-time workers.

The accident rates for men working inside quarries producing building or monumental stone were 1.15 fatalities and 144 injuries per thousand full-year workers, as compared with 1.94 killed and 140 injured in the previous year; the rates for crushed-stone quarries were 2.21 killed and 187 injured, as compared with 2.50 killed and 190 injured in 1922.

At the outside rock-dressing plants of the building-stone quarries the rates were 0.28 killed and 199 injured, as compared with 0.77 killed and 187 injured in the previous year; at crushers, cement mills, etc., the rates were 1.60 killed and 172 injured, as compared with rates of 1.56 killed and 162 injured in the year 1922.

Of the 15,133 accidents reported by the entire quarry industry during the past year, 143 (0.95%) caused death, 12 (0.08%) caused permanent total disability, 431 (2.85%) caused permanent total disability, 2567 (16.96%) resulted in temporary disability lasting more than 14 days, and 11,980 (79.16%) resulted in temporary disability, exceeding the remainder of the day or shift but not exceeding 14 days.

The main causes of accidents inside the quarries were handling rock at the face, flying objects, haulage, falls or slides of rock or overburden, machinery, falling objects, falls of persons and drilling and channeling, in the order stated. Accidents outside the quarries were due mainly to flying objects, machinery, falling objects, haulage, falls of persons and hand tools. The principal causes of accidents resulting in death to employes inside the quarries were falls or slides of rock or overburden, haulage, explosives and falls of persons, while accidents resulting fatally to the employes at the outside plants were due mainly to machinery, haulage, falling objects, falls of persons and burns.

## Cement Man Vice-President of National Safety Council

THE report of the Thirteenth Annual Congress of the National Safety Council, held at Louisville, Ky., states that Henry A. Reninger, of the Lehigh Portland Cement Co., Allentown, Penn., was chosen vice president in charge of industrial safety.

## R. Newton McDowell to Erect New Missouri Crushing Plant

R. NEWTON McDOWELL of Kansas City informs ROCK PRODUCTS that he and his associates have purchased the Blackwater quarry, which is about 20 miles north of Sedalia, Mo., and will erect a crushing plant there shortly. Mr. McDowell is president of the Consolidated Crushed Stone Co., which operates quarries and crushing plants at Gallatin and Smithville, Mo.

The Blackwater quarry has been operated for several years by the S. J. White Stone Co. of Kansas City. The plant is small, producing ordinarily only five cars a day, but the quarry has been well developed and shows a face 60 ft. high and 1500 ft. long. This quarry is especially interesting because it is in the Burlington ledge, which is one of the strong ledges of the Mississippi system and which is a considerable source of limestone in the eastern part of the state.

The new plant will have a capacity of at least 2000 tons per day. In design it will follow something of the lines of the Consolidated Crushed Stone Co.'s plant at Smithville, which was put into production in November.

The Blackwater quarry is especially well situated to market its output for highway purposes, as it is only a short distance from the new main highway between Kansas City and St. Louis, which is to be built of concrete as fast as possible.

Both the Gallatin and the Smithville quarry are running full time and both are adding to their equipment to increase capacity. A new secondary crusher is being placed in the Smithville plant and a new primary crusher in the Gallatin plant. This will bring the capacity of the Gallatin plant to 1000 tons per day.

A great deal of development work has been done at the Gallatin quarry to prepare it for larger production. Something over 12,000 yd. of dirt have been removed and the face has been opened for a length of 2000 ft. The stone is of even better quality than it was anticipated it would be.

Arrangements for washing at least a part of the stone produced are being made at the Smithville plant. These will include a pipe line of considerable length and a high-efficiency centrifugal pump.

## Bondholders Buy Monmouth Stone Plant for $160,000

THE rock crushing plant at Gladstone, Ill., formerly the property of the Monmouth Stone Co., was bought at auction Monday, December 1, by Wilfred Arnold of Galesburg, representing 34 bondholders of the company.

The Monmouth Stone Co. was ordered sold by federal court. The sum of $160,000 was realized at the sale.

The company was formerly headed by J. Howard Jayne, Monmouth millionaire aphasia victim.

The sale was attended by more than 600 prospective buyers, including buyers from seven states.

The property sold includes, in addition to the building and machinery, 110 acres of land adjacent to the plant.

Bondholders of the former organization, by whom the plant was bought at the auction, stated that they intended to resume operations at Gladstone.—*Galesburg (Ill.) Republican.*

## N. S. Greensfelder Becomes Advertising Manager of Hercules Powder Co.

N. S. GREENSFELDER, well known in the quarry and mining industry, chairman of the manufacturers' division of the American Mining Congress and of the National Crushed Stone Association, has become advertising manager of the Hercules Powder Co., succeeding E. I. LaBeaume, who has resigned to become a member of the newly organized firm of Cross & Le Beaume, 250 Fifth avenue, New York City, advertising agency.

Mr. Greensfelder is also editor of the *Explosives Engineer,* published by the Hercules Powder Co. ROCK PRODUCTS joins his many friends in the quarry industry in wishing him all kinds of success under his new and greater responsibilities, but hopes they will not detract from the time and effort he has been able to give the National Crushed Stone Association.

## Canada Cement Earnings

By GORDON C. KEITH
Toronto, Canada

THE production of cement this year by the Canada Cement Co. is about the same as for 1923. Early in the year the company reduced prices in the hope of stimulating the volume of sales, but this did not have the anticipated effect and it is forecasted that the company's earnings will be a little less than in 1923. The Canada Cement Co. is operating less than half of its plants and some of these below capacity. It is felt, however, that the demand for cement will grow and that larger sales and earnings will result. The directors are F. P. Jones, president and general manager; A. C. Tagge, vice-president; H. J. Fuller, vice-president; H. L. Doble, secretary and comptroller; G. W. Allan, Hon. C. C. Ballantyne, R. E. Webster, Angus McLean, D. M. Butchart, R. W. Kelley, Farquhar Robertson, Gordon Edwards, E. M. Young, T. A. Russell, Senator J. P. B. Casgrain and Hon. J. L. Perron, K. C. The authorized capitalization is $11,000,000 of 7% cumulative, of which $10,500,000 is outstanding and $19,000,000 common, of which $13,500 is outstanding. The following are the earnings for seven years:

| Year | Earnings | Dividends | Surplus |
|---|---|---|---|
| 1917 | $2,861,246* | $1,545,000 | $2,576,999 |
| 1918 | 2,215,708* | 1,545,000 | 2,677,643 |
| 1919 | 3,057,553 | 1,545,000 | 1,424,857 |
| 1920 | 2,362,742 | 1,545,000 | 896,970 |
| 1921 | 2,636,460 | 1,545,000 | 614,000 |
| 1922 | 2,403,101* | 1,545,000 | 653,158 |
| 1923 | 2,235,439* | 1,545,000 | 703,550 |

*After allowing for depreciation.

## Railroad Brings Unusual Suit Against Stone Company

AN ACTION in trespass was brought against the American Lime and Stone Co., by the Bellefonte Central Railroad Co., which grew out of a wreck of engine and cars of the plaintiff company operating on the Briarly Branch, owned and controlled by the defendant company, but engines and cars operated by the plaintiff company. The plaintiff contended that the wreck was caused by the growing of weeds and grass along the rails of the track, creating a greasy surface on the rail. While the defendant contended that upon notice received it had removed this weed and grass obstructions and it was not the cause for the wreck of plaintiff's locomotive and cars. Verdict in favor of the defendant.—*Bellefonte (Penn.) Democrat.*

## Limestone Production in Iowa Mainly of Aggregate

THE limestone industry in Iowa is dependent chiefly on those industries which use crushed stone and the leaders of these are the concrete and road metal industries, which used in 1923 nearly 450,000 tons valued at $531,026. Agriculture made the next heaviest demands, using 51,000 tons with a value of $36,000. Stone used for rubble and riprap came next in quantity, although the value was somewhat more—$54,000. Railroad ballast had a value of $30,000 and stone sold to sugar factories was worth $22,000. Evidently stone used by these factories is more valuable than that used for other purposes for the sum named was paid for 12,000 tons. This limestone is used in clarifying beet sugar. Very little building stone is produced in Iowa, the output in 1923 being valued at about $5500.—*Elkader (Iowa) Register.*

## Moore Lime Plant at Durbin, Ohio, Burns

APPROXIMATELY $25,000 loss resulted from a fire which practically destroyed the Moore Lime Co. plant at Durbin, Ohio, just west of Springfield, December 1. The cause of the fire is unknown.—*Columbus (Ohio) Dispatch.*

# Cement Products

TRADE MARK APPLIED FOR WITH U.S. PATENT OFFICE

## Crushes Limestone for Block Aggregate

### Hagerstown, Md., Concern Finds It More Profitable to Make Concrete Block Material Than Commercial Crushed Stone

MANY a stone crushing concern finds it a problem to dispose of the "screenings," the sizes from 3/8-in. or 1/4-in. down, especially where it cannot be sold for agricultural limestone and the market for road dressing is limited. Yet H. E. Bester finds screenings the most profitable product of his stone crushing plant at Hagerstown, Md., and when the supply from ordinary crushing runs short he deliberately crushes the coarser sizes to make more of it.

The answer is that he works it up into concrete products. Hagerstown is a very busy and enterprising town with plenty of building going on, and the blocks find a market as soon as they have been cured.

The quarry and crushing plant have been in service for a good many years; turning out the ordinary commercial sizes of crushed stone and highway material. In later years the market has changed so that only 1¼-in. and ¾-in. sizes are in demand. And there is a far greater demand for the ¾-in. size than for the 1¼-in.

Naturally the crushing of everything to small sizes made a great deal of fines and it was to use up this fines that the concrete block plant was planned and erected.

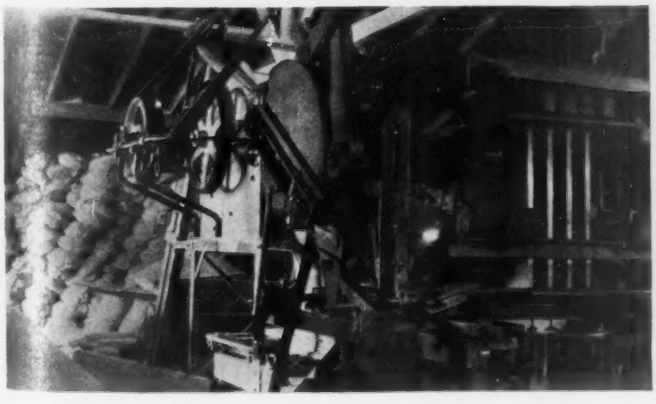
The quarry is on the Pennsylvania railroad just on the edge of Hagerstown, but no shipments are made by rail. Mr. Bester is in the ice business as well as the crushed stone business and maintains a fleet of trucks that make deliveries of both ice and stone as well as the concrete blocks.

The stone is known locally as "bastard" limestone. It is a limestone but it cannot be burned to lime, or at least not a good lime. And the dust is not considered of value as agricultural limestone.

The quarry has been worked over a considerable area on the ground level, the original deposit being higher than this level. Now it is being worked deeper in the same area, a practice that is common throughout this section.

Ingersoll-Rand Jackhamer drills are the only drills used for breaking the rock and block holing. The direction of the holes is accord-

*Concrete block plant of H. E. Bester at Hagerstown, Md.*



*The Bester concrete block machine and mixer designed and built by the proprietor of the plant*

*Ornamental shapes are made from white cement and a light colored silica sand*

ing to the condition of the rock, vertical, horizontal or inclined.

The rock is loaded by hand into dump carts to be taken to the plant. It is a curious thing that these carts have actually proven a cheaper form of transportation than quarry cars on rails. Rails were at one time in use but have been taken up. Of course the reason for this is that the quantity of rock to be handled from one place is small.

There is some dirt in the quarry and it all goes into the fines as the rock is broken. To make sure of getting only clean stone a fork with 1½-in. spaces between the tines is used to load all the small stone. The dirt stays behind.

The crushing plant is small but the design is good and the place is neatly kept. All the machinery was made by the Good Roads Co., with the exception of one crusher, which is a Universal, made in Cedar Rapids, Iowa.

The dump carts take the rock from the quarry up an incline and dump it into the mouth of the primary jaw crusher. A bucket and belt elevator lifts it to the screen where two sizes of stone are made and dust. The oversize goes to the secondary jaw crusher and from this to a small elevator which lifts it high enough to fall through a chute into the main elevator, by which it is taken again to the screen. The Universal crusher is set to one side where it can crush the coarser products to block aggregate which it is sometimes desirable to do.

The concrete block plant contains one Bester machine, designed and built by the proprietor of the plant. It has a mechanical mixer and feeder which takes the concrete to the molds in which it is tamped by power. The whole operation requires only one man to attend it. Finished blocks are placed on steel frame cars and run off to another part of the plant for curing. No steam is used for curing except in the winter time when steam enough is used to keep the air both warm and moist. After curing the blocks are run out on the same cars and unloaded in the storage yard.

Much of the block production is faced with a mixture of cement and silica sand, which is obtained from a pit a short distance north, across the Pennsylvania line. These blocks have the appearance of handsome cut sandstone.

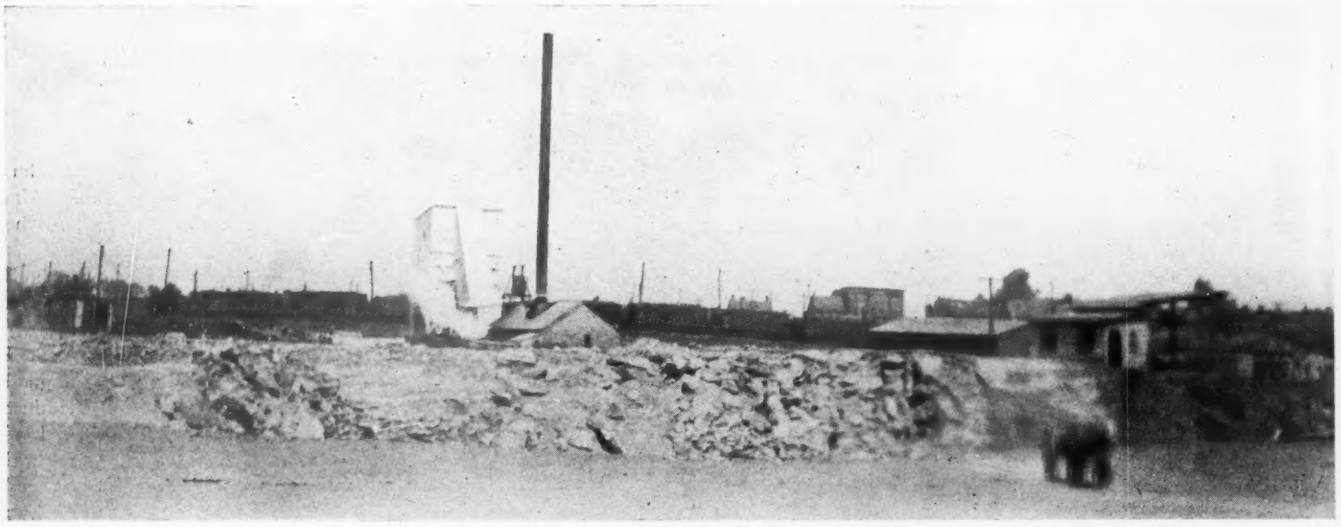
A recent addition to the work has been the molding of ornamental forms such as urns, vases and settees. The concrete for these is made from Medusa white cement and light colored silica sand, so that they are of a pleasant light cream-colored shade.

Attempts have been made to find a cheaper aggregate than crushed stone for making the blocks and a fine gravel and sand from a local pit was tried. But the blocks were not so strong and did not have so good an appearance as those made from the crushed stone so the use of gravel was discontinued.

The block making goes on both in winter and in summer but as in winter the quarry work slackens on account of the weather, a supply of screenings is accumulated in the summer to carry on the winter work.

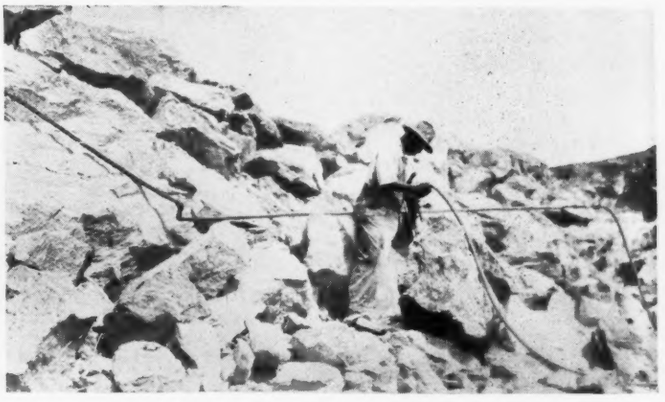
Plant and quarry are in charge of Andrew C. Morgan, who was superintendent for the Susquehanna Quarry Co. before accepting his present position, which he has held for seven years.

Many producers of crushed stone and sand and gravel are thinking of adding a concrete products plant. The plant described here is an evidence of how the concrete products end of the business may grow to be of primary importance in a comparatively short time.

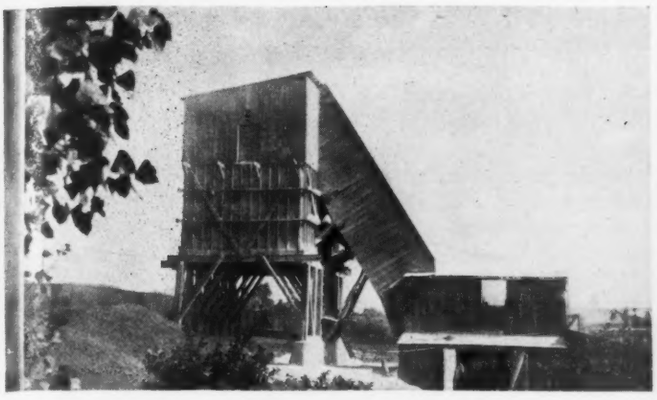


*View of plant and quarry from the railroad*

*View of quarry and cart used in place of quarry cars and said to be cheaper*



*Jackhamers are used for all the drilling, for breaking rock as well as blockholing*



*The crushing plant of H. E. Bester*

*Concrete block aggregate stored for winter work*

## Seattle Concrete Block Makers Win Year-Long Fight

CULMINATING a bitter year-long battle in the building code commission, local makers of hollow concrete building wall blocks, won the second round in their efforts to compete with manufacturers of hollow clay tiles. The public safety committee heard 3½ hours of attack and counter-attack between the opposing forces and then voted, 2 to 1, to approve an ordinance permitting use of the concrete blocks.

As amended, after an entire afternoon of verbal battle in which the cement interests were led by Homer M. Hadley, district engineer for the Portland Cement Association, and the clay people by Francis T. Houlihan, vice-president of the Brick & Tile Delivery Co., the ordinance provides for the use of hollow concrete in walls with a working stress of not more than 90 lb. per sq. in. (the same as the tile); with 1½-in. walls for large structures and "bearing walls" and of 1-in. for partitions and residences.

Individual bricks must be subjected to a load of 1600 lb. if deemed advisable by the building superintendent.—*Seattle (Wash.) Star.*

## Concrete Impregnated with Sulphur Shows Great Gain in Strength

W. H. KOBBE, of New York, in a paper on "New Uses for Sulphur in Industry," prepared for the American Chemical Society, says:

"Cured portland cement concrete absorbs approximately 17% by weight of molten sulphur. This treatment greatly increases its strength, makes it impervious to moisture and improves its resistance to destructive agencies. The unexpected and surprising strength developed in preliminary experiments with impregnated concrete encouraged an extensive series of tests.

"This increase in strength is especially interesting when it is considered that the tensile strength of cement mortar briquets is increased from five to ten times.

"When the voids in a substance are eliminated by filling with another material the compressive strength of the mass is naturally improved. These impregnated briquets, however, show a truly remarkable increase in tensile strength, which is not so easily explained, especially when it is considered that the tensile strength of sulphur is very low, being approximately 200 lb. to the square inch.

"A lean mix of cement and sand breaking under a tension of 150 to 200 lb. is frequently increased to 2000 lb. by this simple treatment. Many hundreds of tests have been made and few of the treated samples failed at less than 1200 lb. per sq. in. Many of them went as high as 1700 to 1800 lb. per sq. in., and a few resisted a tension of 2000 lb. The weaker mixes show a greater proportionate increase in strength than those of a richer composition.—*New York Sun.*

## Cement Products Notes From the Pacific Coast

HEAVILY reinforced blocks with joints of interlocking steel and concrete are being used in the Western Pacific Railroad's new $250,000 machine shop and roundhouse nearing completion at Stockton, Calif.

Three hundred slabs, cast at the same time as blocks for a big oil station at Sacramento, were moved by train and then placed in position. The roundhouse, designed to accommodate 10 locomotives and consisting of 10 identical units, can be extended to accommodate 54.

The Merced Concrete Pipe Company of Merced, Calif., on a bid of $64,260.80, was awarded a contract by directors of the Merced Irrigation District to furnish and install approximately 4½ miles of concrete pipe in the California Packing Corporation orchard. Four other bids received for the work ranged as high at $88,520.

F. C. Swain, president and general manager of the Abalonite Mfg. Co. of Monterey, Calif., is completing arrangements to have his product marketed in the Northern California section. The product "Abalonite" is produced from abalone shells for exterior stucco work and is delivered to the jobs in flakes, one pound covering one square yard. The product sells at $100 a ton.

Emery Blum Co. has opened offices and yards at 68-70 Clara Street, San Francisco, and will specialize in Sciagliola work manufacturing high grade imported marble imitations. The company will also engage in the laying of magnesite flooring. Mr. Emery Blum, president and general manager of the company, prior to his entry into the San Francisco field, was a superintendent of construction in Europe.

The Pacific Lock Joint and Pipe Co. of Seattle, Wash., has purchased a site in Oakland, Calif., and will shortly start construction of a plant for the manufacture of lock joint reinforced concrete pipe of all types, specializing in sewer pipe and hydraulic pressure pipe. Culvert and irrigation pipe, fence posts, electroliers and piles will also be manufactured. Officers of the company are: F. T. Crowe, president; A. T. Windsor, vice-president and general manager; F. M. Crows, secretary; W. W. Brill, consulting engineer.

## Demonstrates the Fireproof Qualities of Concrete Blocks

A DEMONSTRATION of the fire-resisting qualities of concrete blocks took place in Hollywood, Calif., recently.

A building 10x16 ft. had been constructed of concrete blocks furnished by various factories. This building was filled with inflammable material, which was fired by Harley Wadsworth, who represented the Southern California Manufacturers of cement products.

The flames raged in the building for almost an hour, and at the climax the heat registered 1800 deg. All this time the blocks on the outside of the structure remained sufficiently cool to place the hands on.

When the fire had burned itself out it was found that the only damage caused by the fire was a few small holes in the ceiling, caused, officials said, by the fact that the concrete used in the construction of the ceiling had not had time to become sufficiently "cured." After this demonstration it was the unanimous opinion of all those present that a building constructed of concrete tile will insure perfect fire protection. —*San Fernando (Calif.) Sun.*

## Attaching Wires to Concrete Posts

By CHARLES R. NALLE
Wichita Falls, Texas

CONCRETE posts, with their attractive appearance, and their permanence against borers, rot and fire are creating a new era in fence building. Various attendant problems have come up and are being solved while the concrete post marches steadily into its own.

One of the questions difficult of solution has been the attaching of fencing to the posts. Some cast wires or holes for wires and tie it that way. The wires break off, are unsightly, discolor the post and are tedious to fasten. They also involve additional care and labor in casting the post. Some advise cinder concrete as a spiking strip; this very greatly adds to the cost of the post. The "Western Union twist" is another popular style. It however discolors the post, is apt to look sloppy, and takes some skill and time to fasten.

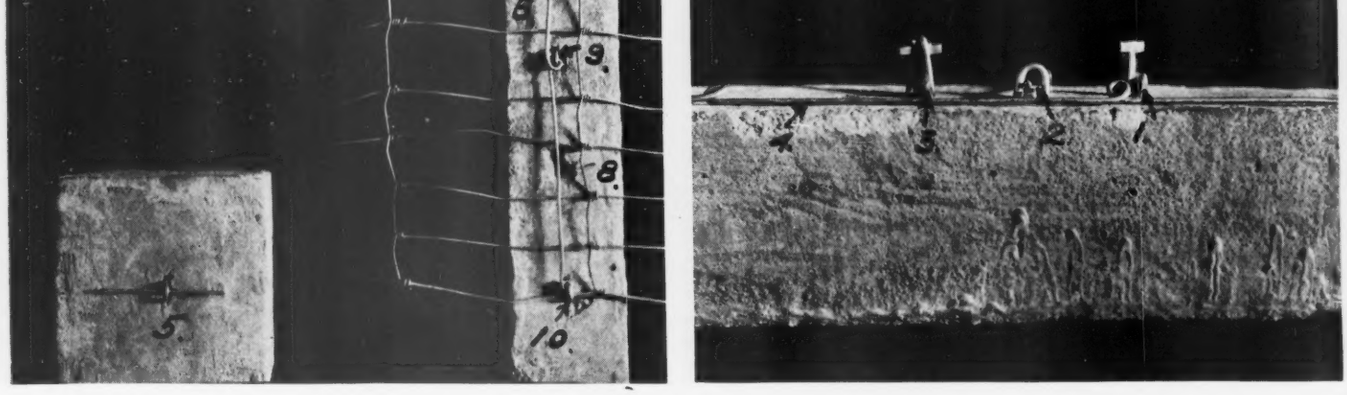
I believe these unsatisfactory methods were one of the factors in retarding the expansion in the use of concrete posts and determined to improve the situation if possible.

My idea is a slot in the post, a lug with a wedging taper, and the old wood fencing staple. The lug is placed in the slot with the wire over it and then the staple is driven over the wire the same as in a wooden post.

Reports of a reliable and disinterested testing laboratory show an average load to extract of 203 lb. direct pull. Slots were used as many as 8 and 10 times without loss of gripping value. Hence the device holds and can be removed and redriven many times in the same slot for fence changes and renewals.

Casting the slots is all required to make the post adaptable to this method. These can be cast at standard intervals, and by using a strap wire over the fence and stapled at these standard slots, any type or kind of fence can be held firmly and securely. Post makers can make a standard post with standard slot intervals suitable to all fencing needs.

Malleable casting seems the most economical production method costing 20c a pound of 50 or more lugs. The saving in labor and the neatness of the appearance greatly outweigh any other method.




***Practical method of attaching wires to concrete fence posts. It consists of a slot in the post, a tapered lug, and the old-fashioned staple***

## City Concrete Pavement Specifications

THE committee on specifications of the American Society for Municipal Improvements for portland cement concrete pavements presented tentative recommendations at its recent convention in Boston embodying suggestions made at numerous conferences during the convention. A few of the details from the new proposed specifications, which were submitted to the convention by E. E. Butterfield, Borough of Queens Laboratory, New York, a member of the committee, are given below:

Fine Aggregate—Ninety-five per cent of the fine aggregate, when dry, shall pass a ¼-in. screen; not more than 25% shall pass a 50-mesh sieve, and not more than 5% by weight shall pass a 100-mesh sieve. In no case shall fine aggregate be accepted containing more than 3%, by dry weight, of clay, loam or silt.

Coarse Aggregate—Coarse aggregate shall be uniformly graded within the following limits:

Passing 3-in. round opening, 100%; passing 2-in. round opening, not less than 82 nor more than 95%; passing ½-in. round opening, not less than 10 nor more than 25%; passing ¼-in. sieve, not more than 5%.

Proportions—In no case shall the proportions be less than 1 part by volume of cement to 2 parts by volume of fine aggregate to 4 parts by volume of coarse aggregate.—*Engineering News-Record.*

## World Saves Ten Billion by Use of Portland Cement

THE first of a series of trips to nearby communities by members of the Chamber of Commerce was made recently and over a hundred chamberites were present as the guests of the Knickerbocker Portland Cement Co. at a luncheon at the Worth hotel at noon. Later an inspection of the big cement plant was made and the Albany portland cement manufactured in its several processes.

Frederick W. Kelley, former president of the Albany chamber, and now president of the Portland Cement Association, was the principal speaker at the luncheon, his subject being "Portland Cement and its Manufacture."

Mr. Kelley called attention to the fact that it is just one hundred years ago since the process for the manufacture of Portland cement was discovered by Joseph Aspdin.

"On October 21, 1824," said the speaker, "Joseph Aspdin, a stone mason of Leeds, England, filed his patent for the artificial manufacture of cement. The ordinary layman does not realize how important a discovery this man made or how great a product he gave to modern civilization.

"Natural cement was known, but it was crude, in comparison to Portland cement. Gypsum and lime mortars were used for stone joints and, frequently, natural cement. But, though the great cathedrals of centuries still stand, it was the tedious, expensive and difficult methods of master masons that reared them.

"Today, by the use of Portland cement and the absolute elimination of stone, if desired, the world saves at least $10,000,000,000 in big building construction. Not only that, but the cost of home building has been considerably lessened by the use of cement. It is so easily used that even unskilled workmen can mix and lay it. It is being more universally used daily as architects and builders discover diversified uses for it."—*Albany Times-Union.*

## An Interesting Explanation of the Stability of Building-Material Industries

A SIDE-LIGHT on the building-material industries by one of the cleverest business writers, "Scrutator," in the *Chicago Tribune* of November 8, offers an interesting, if not altogether true, explanation of the relative stability of the building-material producing industries as compared with some other so-called basic industries. We reprint the article as follows:

"Slowly but surely the building industries are being put on a machine basis. One proof of this is the remarkable amount of shifting by labor from factory to construction work.

"Last summer employment figures showed much unemployment in the Middle West. But where these figures were confined to factories they did not tell the whole story.

"A large amount of industrial labor went into construction work. When practically every construction operation was a skilled hand operation, such shifts were not nearly so feasible.

"One of the outstanding features of post-war economic history has been the comparative stability of prices of building materials.

"There have been fluctuations, of course, but as a rule building costs have not varied so greatly as other prices. Those who have been waiting for bargain prices in building have continued to wait. There is no reason to expect any violent changes in the future.

"Part of this stability is the result of the peculiar nature of the building materials industry. Because of the structure of that business it has always more or less followed the policy that other business has adopted in such large measure in recent years. It has always practiced its variety of "hand to mouth" buying and production.

"It is rare, indeed, that building materials are ever sold below cost. The manufacturer of building materials rarely, if ever, has a big inventory and consequently he never has to make "distress" sales.

"Building materials consist of raw materials like sand, stone, brick, and stock fixtures which are usually not made up until the orders are placed or of things made especially to fit a given building or other construction job. The manufacturer of fixtures usually delays buying his raw materials until he has gotten an order for finished goods. As his part of the building comes in the later phases of its construction, he usually has plenty of time to make up the goods after the order is placed.

"When these conditions eventually spread to the great ventures—farming, oil, and mining, we may see the end of the business cycle as we have known it in the past."

## A Dying Art

THE stone wall extending across the south end of the Cape Girardeau *Missourian's* new building, and a similar wall running down the incline to the basement, have been completed. Such walls are nearly a thing of the past. The rock in these two walls was in the walls that skirted the property before it was cut down to street level, and as it was on hand, it was made use of.

Louis Brinkopf and Charles Bock, two veteran stone masons, and perhaps the only men now in Cape Girardeau who can do such work, put up the walls. Many men have inspected them and declared them to be models of an art that has about disappeared. Stone walls are no longer used because it is much cheaper to put in concrete walls, the cost of the cut stone being very high.

Thirty years ago there were two or three stone quarries in Cape Girardeau from which different kinds of stone were taken for foundations, retaining walls, and even for the surfacing material for houses. There are a few stone-veneered houses in Cape Girardeau that were built within the last 20 years.

The two college dormitories are perhaps the last stone buildings to be erected. The stone came from a quarry on the same property. Since that time very little, if any, stone has been quarried. A few walls have been built of stone that came from other jobs, as in the case of the *Missourian's* walls, but it is probable that these walls will be the last to be used here.—*Cape Girardeau Missourian.*

## Mixing Scientific Concrete by Tables

THE mixing of concrete from a formula which includes the fineness modulus is a job for a mathematician. In the recently issued report of the joint committee on standard concrete specifications there is a series of tables that eliminates the work of calculating a mix. The man who wants to make 1500 lb., 2000 lb., 2500 lb. or 3000 lb. concrete looks at the table given for the desired strength and finds there the proportion of cement needed for practically any combination of coarse and fine aggregates. The slump of the concrete is also given since this partly controls the water-cement ratio.

For example, if he wishes to make 3000 lb. concrete with a slump of 6 to 7 in. and he has sand running from 0 to passing a No. 4 screen and coarse aggregate running from No. 4 to ¾-in., he can get it with a mixture of 1 of cement, 1.1 of sand and 1.6 of coarse aggregate. If he has sand running from 0 to ⅜-in. (properly graded, of course) and coarse aggregate from ¾-in. to 2-in., he will get the same strength and slump with a mixture of 1 of cement, 1.3 sand and 2.4 coarse aggregate. For the first mixture he will have to use considerably more cement than the second. Putting it in another way, the same cement with a better graded aggregate will give him 27% more concrete in place.

The tables are worth intensive study for producers of aggregate, as they show clearly what one aggregate is worth as compared with another for the making of concrete of any particular class.

## Concrete Incinerator Plant Moves to Glendale, California

ESTABLISHMENT of the plant of the Safety Concrete Incinerator Co., Inc., in Glendale, Calif., was announced by J. Feigenbaum, the head of the concern, with the statement that the company will be operating by December 1 and that its weekly payroll will run at least $600.

The company now operates two manufacturing plants in Los Angeles, but it is planned to consolidate the two and bring them both to Glendale as one plant. The company has secured a site of 1½ acres on the Southern Pacific tracks, and in this factory will be manufactured all of the concrete specialties that the company makes.—*Glendale (Calif.) Press.*

## Building Industry Is Key to Prosperity

A SECOND committee from the Unployment Conference undertook the study of seasonal operation in the construction industries. This committee made its report last July.

"The report showed conclusively that custom, not climate, is mainly responsible for the seasonal ups and downs in building, and that these evils are largely unnecessary and can be eliminated," says Secretary Hoover, in his annual report of the Department of Commerce. "For most types of construction it is now possible to build the year round in all parts of the United States. The elimination of these wastes would strengthen the entire business structure, for construction is the balance wheel of American industry. The value of yearly construction in the United States is more than $5,000,000,000. If building falls off, there is always a slackening in many other lines of industry, resulting in unemployment, decreased purchasing power of employees, and further depression."

## Permanent Repairs on the Farm

FOLLOWING up such publications as Concrete on the Farm, the Portland Cement Association has issued an excellent little bulletin called Permanent Repairs on the Farm. It shows, for example, how old buildings may be given a new lease of life by putting concrete foundations under them, how wells may be curbed with concrete, new steps made for old buildings and the like. Aggregate producers realize that there is a real and growing market in the "small jobs" that the farmer and home owner in small towns can do for themselves.

# The Rock Products Market

## Wholesale Prices of Crushed Stone

**Prices given are per ton, F. O. B. at producing plant or nearest shipping point**

### Crushed Limestone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | 1.30 per net ton all sizes | | | |
| Buffalo, N. Y. | | | | | | |
| Chaumont, N. Y. | 1.00 | ..... | 1.75 | 1.50 | 1.50 | 1.50 |
| Columbia, Ill. | 1.10 | 1.20 | 1.35 | 1.35 | 1.20 | 1.20 |
| Eastern Pennsylvania | 1.35 | 1.35 | 1.45 | 1.35 | 1.35 | 1.35 |
| Munns, N. Y. | 1.00 | 1.40 | 1.40 | 1.30 | 1.30 | ..... |
| Northern New Jersey | ..... | ..... | 1.60 | ..... | ..... | ..... |
| Prospect, N. Y. | 1.00 | 1.40 | 1.40 | 1.30 | 1.30 | ..... |
| Walford, Penn. | ..... | 1.35 | ..... | 1.50 | 1.60 | 1.60 |
| Western New York | .85 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL** | | | | | | |
| Alton, Ill. | 1.50 | ..... | 1.50 | ..... | ..... | ..... |
| Bloomville, Middlepoint. Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind. | 1.00 | 1.10 | 1.10 | 1.10 | 1.00 | 1.00 |
| Buffalo, Iowa | 1.10 | ..... | 1.25 | 1.05 | 1.10 | 1.10 |
| Chicago, Ill. | .80 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Dundas, Ont. | .75 | 1.00 | 1.00 | .90 | .90 | .90 |
| Greencastle, Ind. | 1.25 | 1.25 | 1.15 | 1.05 | 1.05 | 1.05 |
| Lannon, Wis. | .80 | 1.10 | 1.10 | .90 | .90 | .90 |
| Linwood, Iowa | 1.00 | 1.25 | 1.25 | 1.05 | 1.05 | 1.15 |
| Northern New Jersey | 1.30 | ..... | 1.80 | 1.60 | 1.40 | ..... |
| Northern Wisconsin | .75 | ..... | 1.05 | .95 | .95 | ..... |
| St. Vincent de Paul, P. Q. | .90 | 1.25@1.45 | 1.00 | .90 | .90 | ..... |
| Stone City, Iowa | .75 | ..... | 1.20† | 1.10 | 1.05 | ..... |
| Waukesha, Wis. | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| Youngstown, Ohio | ..... | ..... | ..... | 1.50 | 1.60 | 1.60 |
| **SOUTHERN:** | | | | | | |
| Alderson, W. Va. | .60 | 1.60 | 1.60 | 1.50 | 1.40 | ..... |
| Bridgeport and Chico, Texas | 100a | 1.35b | 1.35b | 1.25 | 1.20 | 1.15 |
| Cartersville, Ga. | 1.65 | 1.65 | 1.65 | 1.35 | 1.35 | ..... |
| El Paso, Texas | 1.00 | 1.00 | 1.00 | 1.00 | ..... | ..... |
| Ft. Springs, W. Va. | .60 | 1.60 | 1.60 | 1.50 | 1.40 | ..... |
| Graysville, Ga. | 1.00@1.25 | 1.00@1.25 | ..... | .85@1.25 | .85@1.25 | ..... |
| **WESTERN:** | | | | | | |
| Atchison, Kans. | .50 | 2.00 | 2.00 | 2.00 | 2.00 | 1.60‖@1.80 |
| Blue Spr'gs & Wymore, Neb. | .20 | 1.45 | 1.45 | 1.35@1.40 | 1.25@1.30 | 1.20 |
| Cape Girardeau, Mo. | 1.25 | ..... | 1.25 | 1.25 | 1.00 | ..... |
| Kansas City, Mo. | 1.00 | 1.65 | 1.65 | 1.65 | 1.65 | 1.65 |

### Crushed Trap Rock

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Branford, Conn. | .60 | 1.60 | 1.35 | 1.15 | 1.00 | ..... |
| Cypress, Ill. | 1.00@1.10 | ..... | ..... | ..... | ..... | ..... |
| Duluth, Minn. | 1.00 | 2.25 | 1.75 | 1.50 | 1.30 | 1.30 |
| Dwight, Calif. | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | ..... |
| Eastern Maryland | 1.10 | 1.75 | 1.70 | 1.60 | 1.50 | 1.50 |
| Eastern Massachusetts | .85 | 1.75 | 1.75 | 1.25 | 1.25 | 1.25 |
| Eastern New York | .75 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Eastern Pennsylvania | 1.10 | 1.75 | 1.70 | 1.60 | 1.50 | 1.50 |
| Minneapolis, Minn. | 1.25 | ..... | 2.25 | 2.00 | 1.75 | ..... |
| Northern New Jersey | 1.40 | ..... | 1.80 | 1.60 | 1.40 | ..... |
| Oakland, Calif. | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | ..... |
| San Diego, Calif. | .50@ .75 | 1.80@1.90 | 1.60@1.80 | 1.35@1.55 | 1.35@1.55 | 1.25@1.45 |
| Springfield, N. J. | 2.00 | 2.10 | 2.10 | 1.70 | 1.60 | 1.60 |
| Westfield, Mass. | .60 | 1.50 | 1.35 | 1.20 | 1.10 | 1.10 |

### Miscellaneous Crushed Stone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Berlin, Utley and Red Granite, Wis. | 1.60 | 1.70 | 1.60 | 1.50 | 1.40 | ..... |
| Eastern Penn.—Sandstone | 1.25 | 1.65 | 1.60 | 1.40 | 1.40 | 1.25 |
| Eastern Penn.—Quartzite | 1.20 | 1.35 | 1.20 | 1.20 | 1.20 | 1.20 |
| Lithonia, Ga.—Granite | .75 | ..... | 1.50 | 1.25 | 1.25 | ..... |
| Lohrville, Wis. | 1.65 | 1.65@1.70 | 1.65 | 1.45 | 1.50 | ..... |
| Middlebrook, Mo.—Granite | 3.00@3.50 | ..... | 2.00@2.25 | 2.00@2.25 | 2.00@2.25 | 1.25@2.00 |
| Northern New Jersey (Basalt) | 150 | 2.00 | 1.80 | 1.40 | 1.40 | ..... |
| Richmond, Calif. (Basalt) | .75* | ..... | 1.50* | 1.50* | 1.50* | ..... |

*Cubic yd. †1 in. and less. ‖Rip rap per ton; (a) dust in; (b) dust out.

### Agricultural Limestone
**(Pulverized)**

Alton, Ill. — Analysis, 98% $CaCO_3$; 90% thru 100 mesh ..... 6.00

Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk ..... 2.75

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) ..... 5.00

Bridgeport and Chico, Texas—100% thru 100 mesh, bags ..... 10.00

Cartersville, Ga. — Analysis, 56% $CaCO_3$, 42% $MgCO_3$; pulverized ..... 2.25
50% thru 50 mesh ..... 1.50

Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk ..... 2.50

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk ..... 4.00

Dundas, Ont.. Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk ..... 3.00

Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, $5.00; bulk ..... 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk ..... 2.50

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk ..... 2.70

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk ..... 2.75

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk ..... 3.50

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton ..... 2.00

Mayville Wis.—59.8% thru 60 mesh ..... 2.35

Mountville, Va. — Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags ..... 5.00

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) ..... 5.00

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 ..... 2.10@ 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk ..... 3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk ..... 5.50

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk ..... 3.25

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk ..... 3.25

### Agricultural Limestone
**(Crushed)**

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh ..... 1.50

Alton, Ill.—Analysis 98% $CACO_3$; 50% thru 4 mesh ..... 3.50

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh ..... 1.50

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh ..... 1.50

Blackwater, Mo.—98% $CaCO_3$; 100% thru 8 mesh ..... 1.00

Bridgeport and Chico, Texas — 50% thru 50 mesh; 90% thru 4 mesh ..... 1.50
50% thru 4 mesh ..... 1.25

Cape Girardeau, Mo.—Analysis, 93.5% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh ..... 1.50

(Continued on next page)

## Agricultural Limestone

(Continued from preceding page)

| | |
|---|---|
| Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh | .80 |
| Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh | 1.50 |
| Kansas City, Mo.—50% thru 100 mesh | 1.25 |
| Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh | 2.00 |
| Screenings (¼ in. to dust) | 1.00 |
| Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh bulk | 2.60 |
| 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk | 2.25 |
| Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 52% $CaCO_3$, 44% $MgCO_3$; meal, 100% thru 4 mesh, 35% thru 100 mesh | .75@ 1.50 |
| Milltown, Ind.—Analysis, 94.41% $CACO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh .38% thru 50 mesh | 1.45@ 1.60 |
| Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh | 1.50 |
| Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh | 1.25 |
| 50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh | 1.65 |
| River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk | .80@ 1.40 |
| Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh | .75 |

## Pulverized Limestone for Coal Operators

| | |
|---|---|
| Hillsville, Penn., sacks, 4.50; bulk | 3.00 |

## Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton.

| | |
|---|---|
| **Glass Sand:** | |
| Berkeley Springs, W. Va. | 2.25@ 2.50 |
| Cedarville and S. Vineland, N. J.—Damp | 1.75 |
| Dry | 2.25 |
| Cheshire, Mass: 6.00 to 7.00 per ton; bbl. | 2.50 |
| Columbus, Ohio | 1.25@ 1.50 |
| Estill Springs and Sewanee, Tenn. | 1.50 |
| Grays Summit and Klondike, Mo. | 2.00 |
| Mapleton Depot, Penn. | 2.00@ 2.25 |
| Massillon, Ohio | 3.00 |
| Ohlton, Ohio | 2.50 |
| Oceanside, Calif. | 3.00@ 3.40 |
| Pacific, Mo. | 2.25@ 3.00 |
| Pittsburgh, Penn.—Dry | 4.00 |
| Damp | 3.00 |
| Red Wing, Minn.: Bank run | 1.50 |
| Ridgway, Penn. | 2.50 |
| Rockwood, Mich. | 2.75@ 3.25 |
| Round Top, Md. | 2.25 |
| San Francisco, Calif. | 3.00@ 3.50 |
| St. Louis, Mo. | 1.50@ 3.00 |
| Thayers, Penn. | 2.50 |
| Utica, Ill. | 1.00@ 1.25 |
| Zanesville, Ohio | 2.50 |
| **Miscellaneous Sands:** | |
| Aetna, Ind.: Core, Box cars, net, .35; open-top cars | .30 |
| Albany, N. Y.: Core | 1.50 |
| Molding fine, brass molding | 2.25 |
| Molding coarse | 2.00 |
| Sand blast | 4.00 |
| Arenzville, Ill.: Core | 1.00 |
| Molding fine | 1.50@ 1.75 |
| Brass molding | 2.00 |
| Beach City, Ohio: Fine core, washed and screened | 1.50 |
| Furnace bottom; steel molding (fine and coarse) washed and screened | 2.00 |
| Traction | 1.75 |
| Cheshire, Mass.—Furnace lining, molding fine and coarse | 5.00 |
| Sand blast | 5.00@ 8.00 |
| Stone sawing | 6.00 |

(Continued on next page)

# Wholesale Prices of Sand and Gravel

**Prices given are per ton, f. o. b. producing plant or nearest shipping point**

## Washed Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Ambridge & So. H'g'ts, Penn. | 1.25 | 1.25 | 1.15 | .85 | .85 | .85 |
| Buffalo, N. Y. | 1.10 | .95 | | | .85 | |
| Erie, Penn. | | 1.00 | | 1.25 | 1.50 | |
| Farmingdale, N. J. | .58 | .48 | .85 | | 1.10 | |
| Leeds Jct., Maine | | .50 | 1.75 | | 1.35 | 1.25 |
| Montoursville, Penn. | 1.00 | 1.10 | 1.00 | 1.00 | 1.00 | .90 |
| Northern New Jersey | .40@ .50 | .40@ .50 | | 1.25 | 1.25 | 1.25 |
| Pittsburgh. Penn., and vicinity | | 1.25 | 1.25 | .85 | .85 | .85 |
| Shining Point. Penn. | | | 1.00 | 1.00 | 1.00 | 1.00 |
| Washington, D. C.—Rewashed, river | .85 | .85 | 1.70 | 1.50 | 1.30 | 1.30 |
| **CENTRAL:** | | | | | | |
| Attica, Ind. | .75 | .75 | .75 | .75 | .75 | 75 |
| Barton, Wis. | | .22@ .40 | .20@ .40 | .20@ .40 | .32@ .40 | |
| Columbus, Ohio | .75 | .75@1.00 | .75@1.00 | .75@1.00 | .75@1.00 | .75 |
| Covington, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Des Moines, Iowa | .50 | .30 | 1.50 | 1.50 | 1.50 | 1.50 |
| Eau Claire, Wis. | .40 | .40 | .85@1.25 | | | .85 |
| Elkhart Lake, Wis. | .60 | .50 | .60 | .60 | .60 | .60 |
| Ft. Dodge, Iowa. | 1.00 | | 2.05 | 2.05 | 2.05 | |
| Ft. Worth, Texas | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Grand Rapids, Mich. | | .50 | | .80 | .70 | .70 |
| Hamilton, Ohio | | 1.00 | | | 1.00 | |
| Hersey, Mich. | | .50 | | | | .70 |
| Indianapolis, Ind. | .60 | .60 | | .90 | .75@1.00 | .75@1.00 |
| Janesville, Wis. | | .65@ .75 | | | .65@ .75 | |
| Mason City, Iowa | .45@ .55 | .45@ .55 | 1.35@1.45 | 1.45@1.55 | 1.40@1.50 | 1.35@1.45 |
| Mankato, Minn. | | .50 | 1.35 | 1.35 | 1.35 | |
| Milwaukee, Wis. | 1.01 | 1.01 | 1.21 | 1.21 | 1.21 | 1.21 |
| Minneapolis, Minn.* | .65 | 2.50† | 2.00§ | | 2.00 | 1.75 |
| Moline, Ill. | .60 | .60 | 1.20 | 1.20 | 1.20 | 1.20 |
| Northern New Jersey | .45@ .50 | .45@ .50 | | 1.25 | 1.25 | |
| Palestine, Ill. | .75 | .75 | .75 | .75 | .75 | .75 |
| St. Louis, Mo., f. o. b. cars | 1.18 | 1.45 | 1.65§ | 1.45 | | 1.45‖ |
| Silverwood, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Summit Grove, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Terre Haute, Ind. | .75 | .60 | .90 | .90 | .90 | .85 |
| Wolcottville, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Waukesha, Wis. | .55 | .55 | .75 | .75 | .75 | .75 |
| Winona, Minn. | .40 | .40 | 1.25 | 1.10 | 1.00 | 1.00 |
| Yorkville, Sheridan, Oregon, Moronts, Ill. | | | Average .40@.60 | | | |
| Zanesville, Ohio | .70 | .60 | .60 | | .90 | |
| **SOUTHERN:** | | | | | | |
| Brookhaven, Miss., Roseland La. | .70 | .70 | 2.25 | 1.50 | 1.25 | |
| Charleston, W. Va. | all sand 1.37 f.o.b. cars | | all gravel 1.47 f.o.b. cars | | | |
| Chehaw, Ala. | 1.24 | 1.24 | | 1.90 | 1.90 | 1.90 |
| Estill Sp'gs & Sewanee, Tenn. | 1.00 | .90 | 1.00 | 1.00 | | .85 |
| Knoxville, Tenn. | 1.00 | 1.00 | 1.20 | 1.20 | 1.20 | 1.20 |
| Macon. Ga. | .50 | .50 | | .65 | .65 | .65 |
| New Martinsville, W. Va. | 1.00 | .90 | | 1.30 | | .90 |
| **WESTERN:** | | | | | | |
| Baldwin Park, Calif. | | .25@ .35 | | | .50@ .75 | |
| Crushed rock | .90@1.10 | .60@ .90 | .60@ .90 | .60@ .90 | .60@ .90 | |
| Kansas City, Mo. | | | Kaw river sand .75 per ton f.o.b. plants | | | |
| Los Angeles, Calif. | | .40 | .50 | .65 | .60 | .60 |
| Pueblo, Colo. | 1.10 | .90* | | 1.50* | | 1.65* |
| San Diego, Calif. | 50@ .65 | .80@ .90 | 1.40@1.50 | 1.20@1.30 | 1.00@1.10 | 1.00@1.10 |
| Seattle, Wash. (bunkers) | 1.50* | 1.50* | 1.50* | | 1.50* | 1.50* |

## Bank Run Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| Boonville, N. Y. | .60@ .80 | | .55@ .75 | | | 1.00 |
| Brookhaven, Miss., Rosel'd, La. | | | Road gravel, ballast gravel .60 a ton | | | |
| Chehaw. Ala. | .90@1.00 | | | | | |
| Des Moines, Iowa | | | Washed, .50; unwashed, .40 (not screened) | | | |
| Dudley, Ky.‡ | 1.05 | 1.05 | | .95 | | |
| East Hartford, Conn. | | | Sand, .65 per cu. yd. | | | |
| Elkhart Lake, Wis. | .50 | | | | | |
| Gainesville, Texas | | .95 | | | | .55 |
| Grand Rapids, Mich. | | | | .55 | | |
| Hamilton, Ohio | | | | | .70 | |
| Hersey, Mich. | | | | .55 | | |
| Indianapolis, Ind. | | | Mixed gravel for concrete work, .65 | | | |
| Lindsay, Texas | | | | .55 | | |
| Macon, Ga. | .40 | | | | | |
| Mankato, Minn. | | | Pit run gravel, .60 | | | |
| Moline, Ill. (b) | .60 | .60 | Concrete gravel, 50% G., 50% S., 1.00 | | | |
| Montezuma, Ind. | | | | | | .60 |
| St. Louis, Mo. | | | Mine run gravel 1.55 per ton | | | |
| Shining Point, Penn. | | | Concrete sand, 1.10 ton | | | |
| Summit Grove, Ind. | .50 | .50 | .50 | .50 | .50 | .50 |
| Waukesha, Wis. | .60 | .60 | .60 | .60 | .60 | .60 |
| Winona, Minn. | | | | .60 | .60 | .60 |
| York, Penn. | 1.10 | 1.00 | | | | |
| Zanesville, Ohio | | .60 | | | | |

*Cubic yd.; †roofing gravel; §⅝ in. and less; ‡crushed silica; ‖2½ in. and less; (a) ¾ in. and less; (b) river run.

## Miscellaneous Sands

(Continued from preceding page)

| | |
|---|---|
| **Columbus, Ohio:** | |
| Core | .30@ .50 |
| Furnace lining, molding coarse | 2.00@ 2.25 |
| Molding fine | 2.50@ 2.75 |
| Sand blast | 4.00@ 4.50 |
| Stone sawing | 1.50 |
| Traction | .50@ .75 |
| Brass molding | 2.50@ 3.00 |
| **Dresden, Ohio:** | |
| Core | 1.25@ 1.50 |
| Molding fine | 1.50@ 1.75 |
| Molding coarse | 1.50 |
| Traction | 1.25 |
| Brass molding | 1.75 |
| **Dunbar, Penn.:** | |
| Traction (damp) | 2.00 |
| **Eau Claire, Wis.:** | |
| Sand blast | 3.00@ 3.25 |
| **Elco, Ill.:** | |
| Ground silica per ton in carloads | 20.00@31.00 |
| **Estill Springs and Sewanee, Tenn:** | |
| Molding fine and coarse, brass molding | 1.25 |
| Roofing sand, sand blast, traction | 1.50 |
| **Franklin, Penn.:** | |
| Core | 2.00 |
| Molding coarse and fine | 1.75 |
| **Grays Summit, Mo.:** | |
| Molding fine | 1.75@ 2.00 |
| **Joliet, Ill.:** | |
| No. 2 molding sand; also loam for luting purposes and open-hearth work | .65@ .85 |
| **Klondike, Mo.:** | |
| Molding fine | 1.75@ 2.00 |
| **Mapleton Depot, Penn.:** | |
| Molding fine and coarse | 2.00 |
| **Massillon, Ohio:** | |
| Molding fine, coarse, furnace lining core and traction | 2.50 |
| **Montoursville, Penn.:** | |
| Core | 1.25@ 1.35 |
| Traction | 1.00@1.10 |
| Brass molding | 1.50 |
| **New Lexington, Ohio:** | |
| Molding fine | 2.75 |
| Molding coarse | 2.25 |
| **Ohlton, Ohio:** | |
| Core, furnace lining, molding fine and coarse, all green | 1.75@ 1.90 |
| Roofing sand, sand blast, stone sawing, traction, all green | 1.75 |
| Add 50c a ton for green sand dried. | |
| **Oceanside, Calif.:** | |
| Roofing sand (stucco) | 3.00@ 3.40 |
| **Ottawa, Ill.:** | |
| Crude silica sand | .75@ .85 |
| Core, bags, 2.50; bulk | 1.75 |
| Sand blast | 5.00 |
| Stone sawing | 1.75 |
| **Pacific, Mo.:** | |
| Core, furnace lining | 1.00@ 1.25 |
| Molding fine | .90@ 1.00 |
| Stone sawing | 1.00@ 1.75 |
| Molding coarse | .85@ 1.00 |
| **Red Wing, Minn.:** | |
| Core, furnace lining, stone sawing | 1.50 |
| Molding fine and coarse, traction | 1.25 |
| Sand blast | 3.50 |
| Filter sand | 3.75 |
| **Ridgway, Penn.:** | |
| Core | 2.00 |
| Furnace lining, molding fine, molding coarse | 1.25 |
| Traction | 2.25 |
| **Round Top, Md.:** | |
| Core | 1.60 |
| Traction | 1.75 |
| Roofing sand | 2.25 |
| **St. Louis, Mo.:** | |
| Core | 1.00@ 1.75 |
| Furnace lining | 1.50 |
| Molding fine | 1.50@ 2.50 |
| Molding coarse | 1.25@ 1.75 |

## Crushed Slag

| City or shipping point | Roofing | ¼ in. down | ½ in. and less | ¾ in. and less | 1½ in. and less | 2½ in. and less | 3 in. and larger |
|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | |
| **Buffalo, N. Y.** | 2.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **E. Canaan, Conn.** | 3.00 | 1.00 | 2.25 | 1.25 | 1.25 | 1.15 | 1.15 |
| **Eastern Penn. and Northern N. J.** | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Reading, Pa. | 2.50 | 1.00 | 2.50* | 1.25 | | | |
| **Western Penn.** | 2.50 | 1.25 | 1.50 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | | |
| Ironton, Ohio | 2.05 | 1.05 | | 1.45 | | 1.45 | |
| Jackson, Ohio | | 1.05 | | 1.30 | 1.05 | 1.30 | |
| **Youngstown, Dover, Hubbard, Leetonia, Struthers, O.** | 2.00 | 1.25 | 1.35 | 1.35 | 1.25 | 1.25 | 1.25 |
| **SOUTHERN:** | | | | | | | |
| **Ashland, Ky.** | | 1.55 | | 1.55 | 1.55 | 1.55 | |
| **Ensley and Alabama City, Ala.** | 2.05 | .80 | 1.25 | 1.15 | .90 | .90 | .80 |
| **Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.** | 2.50 | 1.00 | 1.25 | 1.25 | 1.25 | 1.15 | 1.15 |

*Clean.

## Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

| | Finishing hydrate | Masons' hydrate | Agricultural hydrate | Chemical hydrate | Ground burnt lime, Blk. | Ground burnt lime, Bags | Lump lime. Blk. | Lump lime. Bbl. |
|---|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | | |
| **Berkeley, R. I.** | | | 12.00 | | | | | 2.30 |
| **Buffalo, N. Y.** | | | | 12.00 | | | | |
| Lime Ridge, Penn. | | | | | | | 5.00a | |
| Williamsport, Penn. | | | 10.00 | | | | 6.00 | |
| **York, Penn.** | | 10.50 | 10.50 | 11.50 | | | 8.50 | 1.65i |
| **CENTRAL:** | | | | | | | | |
| Cold Springs, Ohio | | 9.00 | 9.00 | | 9.00 | 11.00 | 9.00 | |
| Delaware, Ohio | 12.50 | 9.00 | 8.50 | 10.00 | | | 9.00 | 1.50 |
| Gibsonburg, Ohio | 12.50 | | | | 9.00 | 11.00 | | |
| Huntington, Ind. | 12.50 | 9.50 | 9.50 | | 9.00 | | 8.50 | 1.50c |
| **Luckey, Ohio (f)** | 12.50 | | | | | | | |
| Marblehead, Ohio | | 9.50 | 9.50 | | | | 8.50 | 1.50c |
| Marion, Ohio | | 9.50 | 9.50 | | | | 8.50 | 1.70j |
| Mitchell, Ind. | | 12.00 | 12.00 | 12.00 | 11.00 | | 10.00 | 1.70e |
| **Tiffin, Ohio** | | | | | 9.00 | | | |
| **White Rock, Ohio** | 12.50 | | | | 9.00 | 11.00 | | |
| Woodville, Ohio | 12.50† | 9.00† | 8.50† | | 9.00 | 10.50 | 8.00 | 1.60 |
| **SOUTHERN:** | | | | | | | | |
| **Erin, Tenn.** | | | | | | | 8.50 | 1.40* |
| El Paso, Texas | | | | | | | 9.00 | |
| Graystone, Ala. | 12.50 | 11.00 | | 8.50@10.00 | | | 8.50 | 1.50k |
| **Karo, Va.** | | 10.50 | 9.00 | | | | 7.00g | 1.65h |
| Knoxville, Tenn. | 12.50 | 11.00 | | 11.00 | | 1.35 | 8.50 | 1.50 |
| Varnons, Ala. (f) | 11.00 | 11.00 | | | 9.50 | | 8.50 | 15.00 |
| Zuber an d Ocala, Fla. | 14.00 | 12.00 | 10.00 | 14.00 | | | 12.00 | 1.70 |
| **WESTERN:** | | | | | | | | |
| Kirtland, N. M. | | | | | | | 15.00 | |
| San Francisco, Calif. | 22.00 | 22.00 | 15.00 | 22.00 | | | 2.00n | |
| **Tehachapi, Calif.** | | | | | | | 13.00 | 2.00d |

*And 1.50; †50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) wood bbl., $2.20 drum in steel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200 lb. bbl.; 2.65, 300 lb. bbl.; (j) steel; (k) 180 lb. bbl., 1.35; (l) bags; (m) finishing lime, 2.50 common; (n) low grade; 2.50, high calcium.

## Miscellaneous Sands

(Continued)

| | |
|---|---|
| Roofing sand | 1.75 |
| Sand blast | 3.50@ 4.50 |
| Stone sawing | 1.25@ 2.25 |
| Traction | 1.25 |
| Brass molding | 2.00@ 3.00 |
| **San Francisco, Calif.:** | |
| (Washed and dried)—Core, molding fine, roofing sand and brass molding | 3.00@ 3.50 |
| **San Francisco, Calif. (Direct from Pit)** | |
| Furnace lining, molding coarse, sand blast | 3.60 |
| Stone sawing, traction | 2.30 |
| **Tamalco, Ill.:** | |
| Molding coarse | 1.50 |
| Brass molding | 2.00 |
| **Tamms, Ill.:** | |
| Ground silica per ton in carloads | 20.00@31.00 |
| **Thayers, Penn.:** | |
| Core | 2.00 |
| Molding fine and coarse | 1.25 |
| Traction | 2.25 |
| **Utica, Ill.:** | |
| Core, furnace lining, molding fine and coarse (crude and dried) | .60@ 1.25 |
| Roofing sand, stone sawing, brass molding | 1.00@ 1.25 |
| Sand blast | 2.25 |
| Traction | 1.00 |
| **Utica, Penn.:** | |
| Core, molding fine, brass molding | 2.00 |
| Molding coarse | 1.50@ 1.75 |
| **Warwick, Ohio.:** | |
| Core, molding coarse (green) 1.75; (dry) 2.50; traction | 2.50 |
| **Zanesville, Ohio:** | |
| Sand blast, core, traction | 2.50 |
| Furnace lining | 2.25 |
| Molding fine and coarse; brass molding | 1.50@ 1.75 |

## Talc

**Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.**

| | |
|---|---|
| **Baltimore, Md.:** | |
| Crude talc (mine run) | 3.00@ 4.00 |
| Ground talc (20-50 mesh), bags | 10.00 |
| Cubes | 55.00 |
| Blanks (per lb.) | .08 |
| Pencils and steel workers' crayons, per gross | 1.25 |
| **Chatsworth, Ga.:** | |
| Crude—f.o.b. cars | 4.50 |
| Ground (150-200 mesh), bags | 12.00 |
| Pencils and steel workers' crayons, per gross | 1.50 |
| **Chester, Vt.:** | |
| Ground (20-70 mesh) | 7.00@ 8.00 |
| Ground (150-200 mesh) | 8.00@10.00 |
| (Bags extra, returnable) | |
| **E. Granville, Rochester, Johnson, Waterbury, Vt.:** | |
| Ground talc (20-50 mesh) bags | 7.00@10.00 |
| Ground talc (150-200 mesh) bags | 10.00@25.00 |
| Pencils and steel workers' crayons, per gross | .75@ 2.00 |
| **Emeryville, N. Y.:** | |
| (Double air floated) including bags; 325 mesh, C.L., 14.75; L.C.L. | 15.25 |
| **Hailesboro, N. Y.:** | |
| Ground (150-200 mesh) bags | 18.00 |
| **Henry, Va.:** | |
| Crude talc (mine run) per 2000-lb. ton | 2.75@ 3.50 |
| Ground (150-200 mesh), bags | 9.50@15.00 |
| **Joliet, Ill.** | |
| Ground (200 mesh) bags | 30.00@35.00 |
| **Keeler, Calif.:** | |
| (150-200 mesh); carloads, 30 tons or more (bags extra) | 20.00@30.00 |
| **Marshall, N. C.:** | |
| Crude | 4.00@ 8.00 |
| Ground (20-50 mesh), bags extra | 6.50@ 8.50 |
| Ground (150-200 mesh), bags | 8.00@12.00 |
| **Natural Bridge, N. Y.:** | |
| Ground talc (300-325 mesh), 200-lb. bags | 13.00@15.00 |

## Rock Phosphate

**Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.**

### Lump Rock

| | |
|---|---|
| **Gordonsburg, Tenn.—B.P.L. 68-72%** | 4.00@ 4.50 |
| **Mt. Pleasant, Tenn.—B.P.L. 72%** | 5.50@ 6.00 |
| 13% phosphoric acid, 95% thru 100 mesh | 5.75 |
| **75% hand mined** | 6.50@ 6.75 |
| 75% (free of fines for furnace use) | 6.75 |
| **75% max. 5½% I and A** | 6.50@ 7.00 |
| **78% max. 4½% I and A** | 8.00 |
| 75/78 B.P.L. | 6.50@ 8.00 |
| **Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.** | 5.50 |
| **Twomey, Tenn.—B.P.L. 65%, 2000 lb.** | 7.00@ 8.00 |

### Ground Rock

(2000 lb.)

| | |
|---|---|
| Centerville, Tenn.—B.P.L. 65% | 7.00 |
| Mt. Pleasant, Tenn. — B.P.L. 65% 95% thru 100 mesh | 6.50@ 7.00 |
| **Twomey, Tenn.—B.P.L. 65%** | 7.00@ 8.00 |

(Continued on next page)

## Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

| Sizes | Genuine Bangor, Washington Big Bed, Franklin Big Bed | Genuine Albion | Slatington Small Bed | Genuine Bangor Ribbon |
|---|---|---|---|---|
| 24x12, 24x14 | 10.20 | 10.00 | 8.10 | 7.80 |
| 22x13 | 10.80 | 10.00 | 8.40 | 8.75 |
| 22x11 | 10.80 | 10.50 | 8.40 | 8.75 |
| 20x12 | 12.60 | 10.50 | 8.70 | 8.75 |
| 20x10, 18x10, 18x9, 18x12 | 12.60 | 11.00 | 8.70 | 8.75 |
| 16x10, 16x9, 16x8, 16x12 | 12.60 | 11.00 | 8.40 | 8.75 |
| 14x10 | 11.10 | 11.00 | 8.10 | 7.80 |
| 14x8 | 11.10 | 10.50 | 8.10 | 7.80 |
| 14x7 to 12x6 | 9.30 | 10.50 | 7.50 | 7.80 |
| | Mediums | Mediums | Mediums | Mediums |
| 24x12 | $ 8.10 | $8.10 | $7.20 | $5.75 |
| 22x11 | 8.40 | 8.40 | 7.50 | 5.75 |
| Other sizes | 8.70 | 8.70 | 7.80 | 5.75 |

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

## Florida Soft Phosphate

### (Raw Land Pebble)

Per Ton

| | |
|---|---|
| Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68% | 2.25 |
| 70% min. B.P.L., Basis 70% | 2.50 |
| 72% min. B.P.L., Basis 72% | 2.75 |
| 75/74% B.P.L., Basis 75% | 3.75 |

## Fluorspar

| | |
|---|---|
| Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines | 17.50 |
| Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines | 18.00 |
| Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per gross ton | 19.75 |

## Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

| City or shipping point | Terrazzo | Stucco chips |
|---|---|---|
| Barton, Wis., f.o.b. cars | | 10.50 |
| Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries | | 17.50 |
| Crown Point, N. Y.—Mica Spar | | 7.00@ 8.00 |
| Easton, Penn.—Evergreen, grit (bulk) | | 2.00 |
| Royal grit (bulk) | | 3.00 |
| Haddam, Conn.—Felstone buff | 12.00 | 12.00 |
| Harrisonburg, Va.—Blk marble (crushed, in bags | 12.50 | 12.50 |
| Ingomar, Ohio (in bags) | | 6.00@20.00 |
| Middlebrook, Mo.—Red | | 20.00@25.00 |
| Milwaukee, Wis. | | 14.00@34.00 |
| Newark, N. J.—Roofing granules | | 7.50 |
| New York, N. Y.—Red and yellow Verona | | 32.00 |
| Poultney, Vt., 2000 lb. | | 6.12 |
| Red Granite, Wis. | | 7.50 |
| Sioux Falls, S. D. | 7.50 | 7.50 |
| Stockton, Cal.—Sized rock for roofing and stucco dashes, CL lots | | 12.00 |
| Tuckahoe, N. Y.—2000 lb. | | 8.00@12.00 |
| Wauwatosa, Wis. | | 16.00@45.00 |
| Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite | 4.50@ 6.00 | 4.50@ 6.00 |

## Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

| | Common | Face |
|---|---|---|
| Appleton, Minn. | 22.00 | |
| Baltimore, Md. (Del. according to quantity) | 16.00@17.00 | 22.00@50.00 |
| Ensley, Ala. ("Slagtex") | 12.50 | 22.50@33.50 |
| Eugene, Ore. | 25.00 | 35.00@75.00 |
| Friesland, Wis. | 22.00 | 32.00 |
| Milwaukee, Wis. | 14.00@15.00 | 33.00@75.00 |
| Omaha, Neb. | 18.00 | 30.00@40.00 |
| Philadelphia, Penn. | 15.00 | 21.00 |
| Prairie du Chien, Wis. | 14.00 | 22.00@30.00 |
| Puyallup, Wash. | 20.00 | 30.00@90.00 |
| Rapid City, S. D. | 18.00 | 25.00@45.00 |
| Wauwatosa, Wis. | 14.00@18.00 | 30.00@42.00 |

## Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

| | |
|---|---|
| Barton, Wis. | 10.00 |
| Boston, Mass. | 14.00@15.50 |
| Dayton, Ohio | 12.50@13.50 |
| Grand Rapids, Mich. (wholesale) | 10.00 |
| Jackson, Mich. | 13.00 |
| Lancaster, N. Y. | 13.50 |
| Michigan City, Ind. | 11.00 |
| Milwaukee, Wis. | 13.00 |
| Plant City, Fla. | 10.00@11.00 |
| Portage, Wis. | 15.00 |
| Rochester, N. Y. (delivered) | 19.75 |
| Saginaw, Mich. | 13.00 |
| San Antonio, Texas | 12.50@14.00 |
| Syracuse, N. Y. | 18.00 |

## Gray Klinker Brick

| | |
|---|---|
| El Paso, Texas | 13.00 |

## Lime

Warehouse prices, carload lots at principal cities.

| | Hydrated, Finishing | per ton Common |
|---|---|---|
| Atlanta, Ga. | 22.50 | 14.00 |
| Baltimore, Md. | 24.25 | 17.85 |
| Boston, Mass. | 20.50 | 15.50 |
| Cincinnati, Ohio | 16.80 | 14.30 |
| Chicago, Ill. | 20.00 | 18.00 |
| Dallas, Tex. | 20.00 | |
| Denver, Colo. | 24.00 | |
| Detroit, Mich. | 22.00 | 20.00 |
| Minneapolis, Minn. (white) | 25.50 | 21.00 |
| Montreal, Que. | | 21.00 |
| New York, N. Y. | 18.20 | 13.10 |
| Philadelphia, Penn. | 23.00 | 16.00 |
| St. Louis, Mo. | 24.00 | 20.00 |
| San Francisco, Calif. | 22.60 | |
| Seattle, Wash. (paper sacks) | 24.00 | |

## Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albany, N. Y. | | 2.62 |
| Atlanta, Ga. | | 2.35 |
| Boston, Mass. | | 2.53@3.03† |
| Buffalo, N. Y. | | 2.38@2.88† |
| Cedar Rapids, Iowa | | 2.44 |
| Cincinnati, Ohio | | 2.47 |
| Cleveland, Ohio | | 2.39 |
| Chicago, Ill. | | 2.20 |
| Columbus, Ohio | | 2.44 |
| Dallas, Texas | .53¾ | 2.15 |
| Davenport, Iowa | | 2.39 |
| Dayton, Ohio | | 2.48 |
| Denver, Colo. | .63¾ | 2.55 |
| Detroit, Mich. | | 2.40 |
| Duluth, Minn. | | 2.19 |
| Indianapolis, Ind. | | 2.41 |
| Kansas City, Mo. | .54¼ | 1.97 |
| Los Angeles, Cal. (less 5c dis.) | .65 | 2.98 |
| Memphis, Tenn. | | 2.60 |
| Milwaukee, Wis. | | 2.35 |
| Minneapolis, Minn. | | 2.42 |
| Montreal, Canada (sks. 20c ext.) | | 1.90b |
| New Orleans, La. | | 2.40 |
| New York, N. Y. | | 2.15@2.65† |
| Peoria, Ill. | | 2.37 |
| Philadelphia, Penn. | | 2.41@2.81† |
| Phoenix, Ariz. | .82½ | 3.30 |
| Pittsburgh, Penn. | | 2.19 |
| Portland, Ore. | | 3.05 |
| San Francisco, Cal. | | 2.61* |
| St. Louis, Mo. | .57½ | 2.30 |
| St. Paul, Minn. | | 2.42 |
| Seattle, Wash. (10c bbl. dis.) | | 2.65 |
| Toledo, Ohio | | 2.45 |

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.
(b) Less 10c 20 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

| | Per Bag | Per Bbl. |
|---|---|---|
| Buffington, Ind. | .48¾ | 1.95 |
| Concrete, Wash. | | 2.60 |
| Dallas, Texas | | 2.15 |
| Fordwick, Va. | | 2.05 |
| Hannibal, Mo. | | 2.05 |
| Hudson, N. Y. | | 2.05 |
| Kingsport, Tenn. | | 2.05 |
| Leeds, Ala. | | 1.95 |
| Louisville, Ky. | | 2.45 |
| Northampton, Penn. | | 1.95 |
| Steelton, Minn. | .50 | 2.00 |
| Universal, Penn. | .48¾ | 1.95 |

## Cement Products

Hawthorne tile, carload lots, f. o. b. plant.

| | Cicero, Ill. Per sq. | Ft. Worth, Tex. Per sq. |
|---|---|---|
| Silver gray | | 8.00 |
| Red French | 9.00 | 9.00 |
| Green French | 11.00 | 10.00 |
| Red Spanish | 12.00 | 9.00 |
| Green Spanish | 14.00 | 10.00 |

| | Cicero Red | Cicero Green | Ft. Worth Gray | Ft. Worth Red | Ft. Worth Green |
|---|---|---|---|---|---|
| Ridges | .25 | .35 | .25 | .25 | .30 |
| Hips | .20 | .30 | .14 | .14 | .17 |
| Ridge closers | .05 | .06 | .06 | .06 | .06 |
| Hip terminals, 2 way | 1.25 | 1.50 | 1.00* | 1.00* | 1.25* |
| Hip starters | .50 | .60 | .22 | .22 | .25 |
| Gable finials | 1.25 | 1.50 | 1.00 | 1.00 | 1.25 |
| Gable starters | .20 | .30 | .14 | .14 | .16 |
| End bands | .20 | .30 | .... | .... | .... |
| Eave closers | .06 | .08 | .06 | .06 | .06 |

*3-way terminals.

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

| | Crushed Rock | Ground Gypsum | Agricultural Gypsum | Stucco Calcined Gypsum | Cement and Gauging Plaster | Wood Fiber | White Gauging | Sanded Plaster | Keene's Cement | Trowel Finish | Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft. | Plaster Board ½x32x36" Weight 1850 lb. Per M Sq. Ft. | Wallboard, ½x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agatite, Texas (a) | ..... | ..... | 6.00 | 10.00 | 10.00 | 10.50 | 10.00 | ..... | 19.00 | ..... | ..... | ..... | ..... |
| Akron, N. Y. (a) | 3.00 | 4.00 | 6.00 | 10.00 | 10.00 | 10.00 | 20.20 | 7.00@9.00 | 27.35 | 21.00 | 19.375 | 20.00 | 30.00@32.00 |
| Blue Rapids, Kans. (a) | 2.50 | 4.00 | 6.00 | 10.00 | 10.00 | 10.50 | 10.00 | ..... | 23.15 | 19.00 | 19.375 | 20.00 | ..... |
| Douglas, Ariz. | ..... | ..... | 7.00 | ..... | 16.50 | ..... | 19.50 | ..... | ..... | 15.50 | ..... | ..... | ..... |
| Ft. Dodge, Iowa (a) | 2.50 | 4.00 | 6.00 | 10.00 | 10.00 | 10.50 | 15.45 | ..... | 22.70 | 20.00 | 19.375 | 20.00 | 30.00 |
| Grand Rapids, Mich. | 2.75* | 6.00† | 6.00† | 9.00‡ | 10.00‖ | 10.00‖ | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Gypsum, Ohio (a) | 2.75 | 4.00 | 6.00 | 10.00 | 10.00 | 10.00 | 19.25 | 7.50 | 26.85 | 19.00 | 19.375 | 20.00 | 30.00 |
| Hanover, Mont. | ..... | ..... | ..... | 11.80 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Port Clinton, Ohio | 3.00 | 4.00 | 6.00 | 8.00 | 9.00 | 9.00 | 21.00 | 7.00 | 30.00 | 20.00 | ..... | 20.00 | 30.00 |
| Portland, Colo. | ..... | ..... | ..... | 10.00 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| San Francisco, Calif. | ..... | ..... | 10.15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Winnipeg, Man. | 5.50 | 5.50 | 7.00 | 13.50 | 15.00 | 15.00 | ..... | ..... | ..... | ..... | 28.50 | ..... | 33.00 |

NOTE—Returnable Bags, 10c each; Paper Bags, 1.00 per ton extra (not returnable).
*To 3.25; †to 8.00; ‡to 11.00; ‖to 12; (a) prices are net of bags.

# New Machinery and Equipment

## New Roller Hanger Bearing

THE Dodge Manufacturing Corporation, Mishawaka, Indiana, has placed on the market a new lineshaft bearing embodying the Timken tapered roller bearing, and several new features of construction.

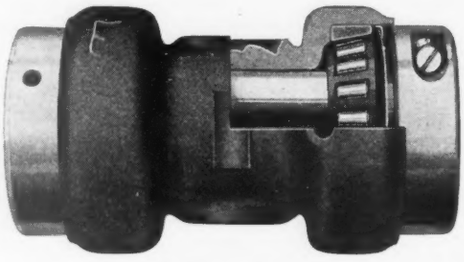
This is a simple bearing, in that there are only five parts to the complete assembly. It consists of two Timken tapered roller bearings mounted on a ground and slotted steel tube and fitted to an accurately machined housing. The ends of the steel tube are threaded to receive clamping collars designed to secure accurate adjustment of the bearings on the tube. This adjustment is made at the factory and need not be altered by the user.

According to the manufacturers the mounting of the tapered roller bearings, as described, insures full utilization of the bearings for both radial and thrust loads. It also adds to the ruggedness of the assembly and is of particular value in resisting the side weave of heavy driving belts. The method of fastening the steel tube or sleeve to the shaft permits its use on any commercial shafting. This fastening is accomplished by simply setting up the screws in each of the two clamping collars.

The dust-proof feature of this bearing is also of great importance. The sleeve on which the bearings are mounted extends from end to end of the housing. Liberal grease compartments are provided inside of the housing and outside of the tube. The outer ends of the bearings are protected against dust by special metallic grease seals which eliminate friction at this point and likewise prevent dust working in or the lubricant working out. These grease seals take the place of felt washers or packing.

The Timken tapered roller bearing is constructed on the cone principle which insures a true rolling action. The bearing itself comprises four parts, a cone or inner race with outside taper, the tapered rollers, a cage or roll retainer and a cup or outer race with inside taper.

The erection of this new lineshaft bearing is very simple. It is only necessary to slip the bearing over the shaft and set up the clamping screw in each of the split clamping collars. To remove it is necessary to loosen the screws in the collars and slip the bearing off the shaft.



*New hanger roller bearing*

## Improved Jeffrey Loader

THE three illustrations of Jeffrey loaders are interesting as showing the development of this machine, first introduced by the Jeffrey Manufacturing Co. of Columbus, Ohio, in 1910. Both types are still in use.

The Jeffrey radial type was introduced in 1920 and is still in favor, where it can be used on a fairly solid foundation. It can dig from 8 to 10 ft. into a storage pile, and is easily controlled by one man at the side. It is made in capacities from 1 to 2 yd. per minute.

The "tanktread" designed to move over soft or uneven ground is a stronger machine mounted on a crawler tread. It will handle material like crushed stone with pieces up to 3½-in. ring and has a capacity of 1½ to 2 yd. per minute, or coal up to 8-in. lump. It may be mounted with either a swivel spout or a botcher hopper, which has a capacity of 21 cu. ft.

The weight of the machine is carried by a three-point suspension on three crawlers so that it can move over rough or uneven ground without undue weight being thrown on one tread.

A feature of this machine is the clean-up device, two revolving spiders with a plate steel scoop. The spiders are driven independently and a simple safety device prevents breakage in case a spider catches.

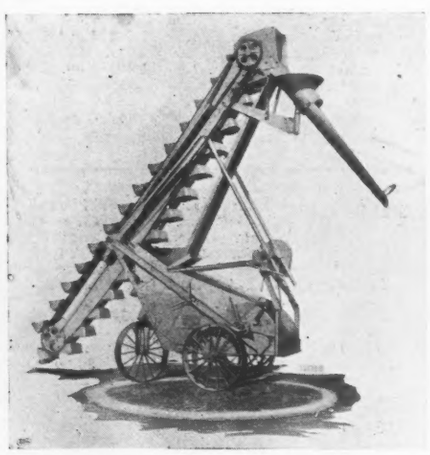
The driving mechanism is independently mounted in a rigid frame and the power unit is supported on a heavy shelf so that gears are kept in line and cannot get out of mesh. Propelling, steering and elevator operation are accomplished by means of multiple disk clutches, and the treads are controlled by a brake mechanism on the differential shaft so that the machine may be turned on the center of either crawler as a center.

There are two speeds forward and two reverse. The high speed, 50 ft. a minute, is for moving the machine, and the slow speed of 2 ft. per minute is used for digging.

Lubrication is through a high pressure system with explosive action, which forces in the grease and forces out dirt and foreign substances.

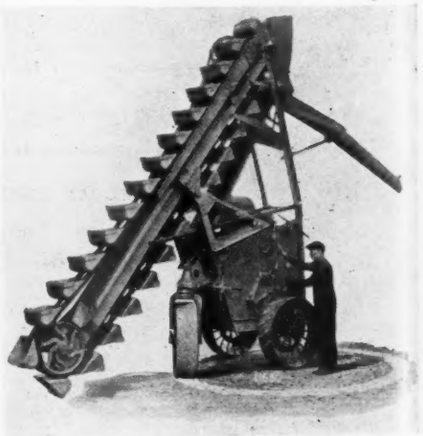
## New Electric Hoist

A NEW electric monorail hoist designed to operate in a minimum headroom has been developed by the American Engineering Co., Philadelphia, Penn., in half-

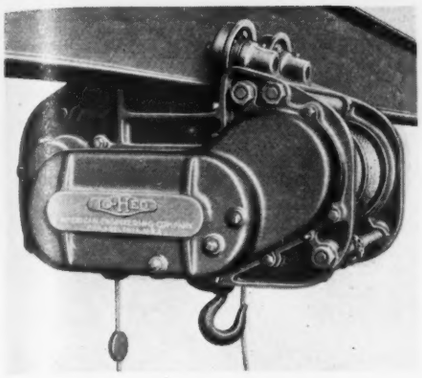


*Type K radial loader*

*"Tanktread" loader*



*Type G radial loader*



*New electric monorail hoist*

ton and one-ton sizes. This hoist retains most of the features of the line of "Lo-Hed" hoists manufactured by this company, but is smaller and lighter than the other members of the "Lo-Hed" family, and is intended for general utility use where a light, handy hoist is needed.

The outstanding feature of this new hoist is its ability to draw up the load hook until it almost touches the rail, which makes it available in places where the headroom is low. It gives additional clearance and safety for bulky loads and makes it possible to pile materials high, thus increasing capacity by utilizing the space almost to the ceilings.

Automatic holding and lowering brakes are provided, and a safety device checks the hoist and throws off the current when the upper limit of travel is reached. High-duty roller bearings and automatic lubrication give an efficiency of 80 per cent, and a factor of safety of at least five makes overloads possible in emergency, the manufacturer claims.

These hoists are furnished for either direct or alternating current. All working parts are accessible, and the motor can be removed for repairs in a few minutes, it is stated, without touching the load on the hook.

## New Hardsocg Drill Bits

THE Hardsocg Promotion Co., Ottumwa, Iowa, has been formed to sell tools and specialties for drilling in the development of which Martin Hardsocg has been engaged for the last 50 years.

The Hardsocg detachable rock drill bit and a new well drill bit are two of these and represent the latest ideas of this pioneer in rock-drill improvement.

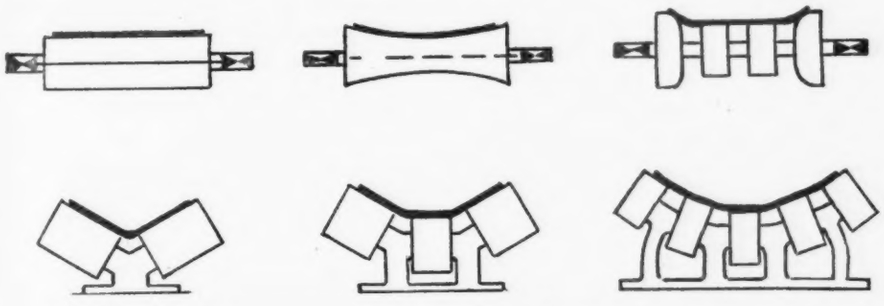
Mr. Hardsocg's great invention was drill steel with a hole out of which the dust and cuttings could be blown, which is now in general use. He could not buy such steel when he began to make his drills, but now it can be bought in any amount. At the age of seventy-two, Mr. Hardsocg is still active in drill development.

## History of Troughing Belt Conveyors

THE belt conveyor of the troughing type has been used over 30 years and its development is interesting. The following description and illustrations, furnished by the Variety Iron and Steel Works Co., give the evolution from the simple carrier to the five-pulley trough:

1. Flat-roll Plain Bearing Cast-iron or Wood Roll. This idler was first used to carry packages or bulk material, which was not likely to roll off.

2. Concave-roll Plain Bearing Cast-iron or Wood Pulleys. This was an improvement over the first idler and would permit the carrying of material likely to roll off, but on account of the slippage, would wear the belt and the roll, due to the different diameters of the roll.



*Evolution of a belt conveyor from a simple carrier to the five-pulley trough*

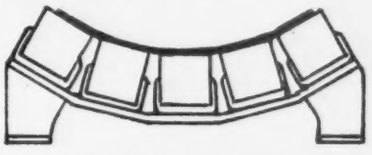
3. Dish-pan Plain Bearing Cast-iron Pulleys. This idler was designed to reduce wear on belts caused by slippage.

4. Two-pulley Idlers Plain Bearing Cast-iron Pulleys. This idler was designed to overcome slippage, but was found to bend and break the belts in the middle. Also, it was found on belts of any great length that it was impossible to "train" them, and when a belt ran light it had a bad condition of belt wear on the edges. It has been shown by experience that about 80% of the belt wear is in its cover and 20% in its body.

5. Three-pulley Plain Bearing Cast-iron Pulleys. This idler was a big improvement but also cracks the belts if the side pulleys are set at too great an angle. However, these types are commonly used now on narrow belts and are practical when design is correct on steel pulleys with added friction bearings.

6. Five-pulley Plain Bearing Cast-iron Pulleys. This idler is a later and better type, but pulleys are made of cast-iron which are easily broken and cut the belt. More than 300% of the grease is lost.

7. Five-pulley Anti-friction Bearing Steel Pulleys. This idler is an improvement over cast-iron pulleys and plain bearings, but no method has been provided to furnish lubricant to bearings except to saturate the belt washer. Bearings are outside, where they gather dirt, dust, and grit. They are also built on a flat surface, a plank or a 6-in. channel which permits material to build up, causing pulleys to become a brake wheel instead of a carrier, thereby retarding service and causing friction and wear on both pulley and belt.

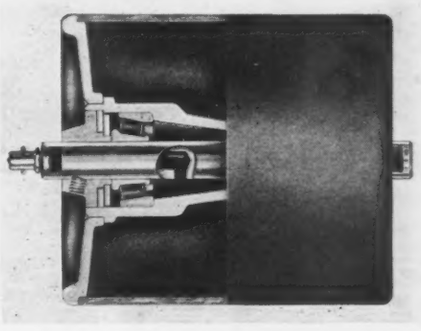


*Latest Philips troughing conveyor*

The Philips belt conveyor, made by the Variety Iron and Steel Works Co., 1277 East 40th street, Cleveland, Ohio, the manufacturer states, represents the latest development and a distinct advance over other types.

The shell of the pulley is of one-piece, light-weight, steel tubing, claimed to be as strong as cast iron. The edges are rounded and the ends securely welded to the hub and shell to prevent the nuts from working loose. The hub is chambered to receive two anti-friction bearings, either Hyatt or Timken roller or ball bearings, which are mounted on a shaft held stationary in brackets on a T-iron. The space between the shaft and the hub forms a grease chamber, grease being forced to the hub by the Alemite high-pressure system through the end of the shaft.

The manufacturer claims that there is a power saving of from 20 to 50%, that lubricating is required only once a year, and that the bearings are protected from dust, dirt, and grit.



*Cross-section of pulley of the Philips troughing conveyor*

# News of All the Industry

## Incorporations

**Buckingham Feldspar, Ltd.**, Montreal, Canada, has been registered.

**Danforth Stone Supply Co.**, Toronto, Ont., Canada, has been registered.

**Lanctot & Charland**, manufacturers of cement blocks, Montreal, Canada, have been registered.

**Dupont & Milard**, manufacturers of cement blocks, Montreal, Canada, have been registered.

**Saluda Crushed Stone Co.** has been incorporated under the laws of Delaware for $100,000 to $200,000.

**Morris Stone Co.**, Macon, Ga., has been incorporated for $50,000 by C. A. Morris, A. I. Morris, and others.

**Hollywood Concrete Construction Co.**, Hollywood, Fla., has been incorporated by C. O. Dickey, and C. Erickson.

**Twin City Gravel Co.**, Texarkana, Ark., has been incorporated for $20,000 by G. L. Horton, R. W. Rodgers, and M. H. Edmondson.

**Standard Rock Asphalt Co.**, Bowling Green, Ky., has been incorporated for $500,000 by C. C. Boller, M. C. Abengerg, and W. E. Hailey.

**Aetna Quarries, Inc.**, Denver, Colo., has been incorporated for $1,000,000 by Cornelius A. Cole, Robert A. Van Voorhis, and William E. Shiels.

**Palm Beach Sand and Supply Co.**, West Palm Beach, Fla., has been incorporated for $50,000 by Chas. B. Woodruff, H. P. Jones, and others.

**Marble Products Co.**, Kansas City, Mo., has been incorporated for $40,000 by J. R. Mentzer, 1006 Centon boulevard, H. Von Unwerth and others.

**Franklin Road Quarry Co.**, 342 East 20th street, Baltimore, Md., has been incorporated for $10,000 by George D. Bolton, C. W. McLaughlin, and others.

**Scheiber Concrete Roof Tiling Co.** has been incorporated in Missouri for $50,000. F. C. Scheiber, principal Missouri agent, 3208 Dodier street, St. Louis, Mo.

**Osage Gravel Co.**, Jefferson City, Mo., has been incorporated for $60,000. (Attorney, Stratton Shartel, care of office of the Attorney General, Jefferson City, Mo.

**Cherokee Mines, Inc.**, Asheville, N. C., has been incorporated for $100,000 by C. Marshall Gravatt, 303 Cumberland avenue; Thomas A. Jones, Jr., and others.

**Mason City Co.**, Mason City, Iowa, has been incorporated for $250,000 and will handle cement, plaster, etc. Incorporators: E. W. Taylor, E. J. Slater, and C. G. Crittenden.

**Horton & Horton**, Houston, Texas, has been incorporated for $500,000 by George F. Horton, R. F. Crawford, and A. A. Thorstenburg for the purpose of mining and producing gravel.

**Plasterers Materials Co.**, Los Angeles, Calif., has been incorporated for $400,000 by J. F. Kirby, Florence D. Kirby, J. H. Powell, Laura B. Stephens, and Mabel Franklin.

**Acme Rock Asphalt Corp.**, Lonegrove, Okla., has been incorporated for $50,000 by A. W. Thomas, Lonegrove; F. C. Munn; and W. R. Haight, the last two mentioned from St. Louis, Mo.

**Texas Mica Corp.**, Franklin, N. C., has been incorporated for $30,000 by E. S. Galloway, Franklin; Charles C. Allen, 1423 Kings Highway; and M. R. McKinnon, the last two mentioned from Dallas.

**Feura Bush Concrete Products Corp.**, Feura Bush, N. Y., has been incorporated for $25,000. Incorporators: J. A. Shultz, M. S. Mathias, and O. H. Brate. (Attorneys, Whalen, Murphy, McNamee & Creble, Albany, N. Y.)

**Missouri Crushed Stone Co.**, Carthage, Mo., has been incorporated for $20,000. The main offices will be in Joplin, and the quarry and holdings of the company will be in Phenix, Mo. Directors: V. E. Koch, Joplin, president and treasurer; A. M. Baird, Carterville, general manager and secretary.

## Sand and Gravel

**Leesburg Sand and Supply Co.**, Leesburg, Fla., has awarded a contract to the Maddox Foundry and Machine Co., Archer, Fla., to build an 8-in. suction dredge complete with two carrying barges 28x85 ft. long.

**Hugh H. Humphreys**, Fredericktown, Mo., is said to have secured extensive gravel deposits along Castor river and is in negotiations with the State Highway Commission to supply the gravel and crushed stone with which to pave No. 9. If his survey of the needs in this section of the state justifies it, Mr. Humphreys plans an extensive gravel and crushed stone industry in this county.

## Quarries

**Huntsville Stone and Crusher Co.**, Huntsville, Texas, has increased its capital from $50,000 to $80.000.

**Crystal River Rock Co.**, Crystal River, Fla., is having a complete crushing, washing, and sizing plant built by the Maddox Foundry and Machine Co., Archer, Fla.

**Ohio Marble Co.**, Piqua, Ohio, has let the contract for a complete pulverizing unit, including screens, elevators, and motors, to the Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

**Westmoreland Lime Stone Co.**, Hermanie, Penn., has purchased equipment for a crushing plant, including crushing machinery, elevators, screens, and motor drives, from the Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

**Stokes & Blood**, Bentonville, Ark., purchased the long unused rock crusher from the city of Bentonville and moved it to their plant, just north of town, where they will begin at once to crush rock for the Silver Construction Co.

**Schweitzer Bros.' Verdugo Quarries** rock crushing plant located in Verdugo canyon near Montrose, Los Angeles, Calif., representing an investment of about $100,000, is now completed. The new plant has four bunkers, storage bins, and a blacksmith shop on the 980-acre tract of the company, the deposits consisting of black granite, limestone, and silica. It is stated that the eight-hour capacity of the rock crushing plant is between 800 and 1000 tons.

## Cement

**Giant Portland Cement Co.**, Philadelphia, Penn., has declared a dividend of 7% on the preferred stock on account of accumulations, December 15; also a semi-annual 3½% dividend on preferred stock, December 16.

**National Cement Co.**, Montreal, Canada, has offered mortgage bonds to the extent of $1,500,000 at an interest rate of 7%, the object being to raise capital to complete the construction of a cement mill in Montreal East, Quebec, which will be capable of producing 3500 bbl. a day. Manuel L. Sylvia, New Bedford, Mass., is president of the company, and Canadian and American interests are said to be back of the project.

## Cement Products

**Canadian Concrete Products Co.** will erect a plant at Belleville, Ont.

**E. H. Higgins Building Material Co.**, Richmond, Calif., is having machinery installed at 2 Sixth avenue, where the company will engage in the manufacture of concrete hollow blocks, concrete brick, and roofing tile. A machine said to turn out between 400 and 500 blocks a day has been received from Denmark and will be in operation shortly.

**G. W. Van Tasel Co., Inc.**, Houlton, Maine, has changed the firm name from G. W. Van Tasel Co., Inc., to the Van Tasel Construction Co., and has filed certificate with the state for an increase in capitalization from $30.000 to $200,000, according to reports. The officers are G. W. Van Tasel, president; F. A. Smith, vice-president; J. R. Harvey, treasurer; Charles H. Fogg, secretary, and W. R. Alexander, superintendent and engineer. It is said that the company proposes to erect an up-to-date concrete products plant in Houlton equipped with up-to-date modern equipment and steam curing system for manufacturing cement bricks, sewer pipe, culvert, etc.

## Lime

**Pittsfield Lime and Stone Co.**, Richmond, Mass., has completed plans for the construction of a plant, estimated to cost about $200,000. President, R. Soper, 147 West 42nd street, New York City. R. K. Meade & Co., 11 East Fayette street, Baltimore, Md., are the engineers.

## Personals

**Fred Kreutzfeld** has been made office manager of the United States Gypsum Co.'s Plastico, Va., plant.

**S. Neal Hallock**, president of the Hallock Sand Co., Columbus, Ohio, who has been ill from pneumonia for four weeks, is much improved.

**K. M. Grier** of the Blue Diamond Co., Los Angeles, Calif., spoke on "Mortar in Building Construction" at the third annual meeting of the Pacific Coast Building Officials Conference, held in Oakland, Calif., in November.

**C. J. Thompson** has been appointed by the Osgood Co., Marion, Ohio, district sales manager in charge of the New York district with offices at 50 Church street, New York City. The company states that Mr. Thompson has had wide experience in the excavating machinery and contracting field.

## Obituary

**H. J. Holbrook**, president of the Cement-Concrete Culvert Co., of East Point, Ga., and a prominent citizen of that suburb, was killed November 25 when the automobile he was driving was struck by an inbound Central of Georgia passenger train at the East Washington street crossing in East Point.

## Manufacturers

**Sullivan Machinery Co.**, Chicago, Ill., removed its Cleveland office in the Rockefeller building from Room 824 to Room 701. Ralph T. Stone is district manager.

**Foote Bros. Gear and Machine Co.**, Chicago, Ill., has recently completed arrangements with Chas. Bond & Co., Philadelphia, Penn., for the distribution of its IXL gear products and speed reducers in eastern Pennsylvania and Maryland, the state of Delaware, and all of New Jersey south of Mercer county.

**Pawling & Harnischfeger Co.**, Milwaukee, Wis., manufacturer of electric traveling cranes, excavating machinery, etc., has changed its name to the Harnischfeger Corp. Articles were amended increasing the capitalization from $3,000 000 to $6,000,000. The company has just observed the fortieth anniversary of its establishment. Officers are: Henry Harnischfeger, president and treasurer; Arthur G. Henricks, vice-president and general manager; Walter Harnischfeger, vice-president; Rene von Schleinitz, secretary.

**Link-Belt Co.**, Chicago, Ill., owing to the greatly increased demand for its products and close range service, has erected a new warehouse and office building at 5938 Linsdale avenue, Detroit, Mich. It houses not only the general office for the Detroit branch, but a large warehouse where standard Link-Belt and H. W. Caldwell & Son Co. products are kept in readiness for immediate shipment. This stock includes the various types of chains for elevating, conveying, and power transmission purposes, sprockets, clutches, malleable iron elevator buckets, etc.

## Trade Literature

**Brown Hoisting Machinery Co.**, Cleveland, Ohio, has recently issued an eight-page folder, Booklet 8-24, illustrating and describing its "Brownhoist" clamshell buckets. A number of installation pictures are given, and diagrams of the buckets as well as tables of specifications are included.